FACULTY OF ARTS, SCIENCE AND HUMANITIES

Name of the Department: Commerce

Name of the Course: B.Com

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19LAU101</td>
<td>Language - I</td>
<td>1. இந்தியகுடியுரிமைப் பணி முதலான பபாட்டித் பதர்வுகளில், இலக்கிய இலக்கியங்கமள் ஆணுக்கான முழுமையான அறிமுகை்பபற்றிருத்தல். 2. கல்பவட்டியல், ஓமலச்சுவடியியல் குறிப்பிட்டியல் ஆவணத் பதடலுக்குரிய ஆய்வு முயற்சியைனப்பான்மையுடன், இலக்கியங்கமள் அணுகுதல். 3. அறிவியல் தமிழ் குறித்த பன்பநாக்கு அணுகுதலான ஆய்வுச் சிந்தமன் பைை்பாடு. 4. பவமலவாய்ப்புத் துமறசார்ந்த பவமலவாய்ப்புத் திறன் பபற்றிருத்தல் 5. சமுதாயைற்றுை் வாழ்வியல் திப்புகமளப் பபணுவதற்குக் கருவியாக இலக்கியங்கமள் நாடுகின்ற பபான்மை வளர்ச்சி. 6. பைாழிபபயப்புத் துமறசார்ந்த பைாழிபபயப்புத் திறன் பபற்றிருத்தல்</td>
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</table>
| 2 | 19ENU101 | English – I | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment  
5. Communication skills will get developed.  
6. Develop to have language competence |
|---|---|---|---|
| 3 | 19CMU101 | Financial Accounting | 1. Comprehend the accounting concepts, principles and to comply the accounting standards.  
2. Prepare the final accounts and compute inventory valuation.  
3. Recognize the accounting process of financial statement and critically think in preparing accounts, rectification of errors, Consignment and Joint Venture.  
4. Acquire knowledge on accounting for branches and also to ascertain the financial position of each branch separately.  
5. To apply appropriate judgment derived from knowledge of accounting theory to prepare and validate the accuracy of financial statements.  
6. Apply the accounting procedures for partnership firm |
| 4 | 19CMU102 | Business Law | 1. Identify the basic legal principles behind contractual agreements.  
2. Understand the relevance of business law in economic and social context.  
3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.  
4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.  
5. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.  
6. Prepare various agreements related to contract |
| 5 | 19AEC101 | Business Communication | 1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.  
2. Draft business correspondence for the organization requirement.  
3. Prepare business reports for organization needs.  
4. Use appropriate technology for business communication. |
| 5. Draft the resume and develop the skills to face the interview.  
6. Use appropriate technology for business communication. |
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<tbody>
<tr>
<td>6. <strong>19LAU201 Language – II</strong></td>
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</tbody>
</table>
| 1. இந்தியக்குடியுரிமைப் பணி முதலான பபாட்டித் பதர்வுகளில், விருப்பப் பாடைாக இடை்ப்பறுகின்ற, ‘தமிழ் இலக்கிய வரலாறு’ குறித்த அறிமுகை்பபற்றிருத்தல்.  
2. கல்பவட்டியல், ஓமலச்சுவடியியல் மைற்றுை்ப்பால்லியல் சார்ந்த ஆய்வுைனப்பான்மையுடன், இலக்கியங்கமள அணுகுதல்.  
3. கல்லறை வாழ்வியல் சார்ந்த பவமலவாய்ப்புக்குரியச் சுயதிறன் பைை்பாடுை்பபற்றிருத்தல்.  
4. சமுதாயைற்றுை் வாழ்வியல் துமற்பந்திலான, பமடப்பாக்கத்திறன் பைை்பாடுை்பபற்றிருத்தல்.  
5. இந்தியக்குடியுரிமைப் பணி முதலான பபாட்டித் பதர்வுகளில், விருப்பப் பாடைாக இடை்ப்பறுகின்ற, ‘அறிவியல் தமிழ்’; ‘இமணய தமிழ்’ குறித்த அறிமுகை்பபற்றிருத்தல், இலக்கியங்கமள அணுகுமுமறயிலான ஆய்வுச் சிந்தமன் பைை்பாடு. |
| 7  | **19ENU201 English – II** |
| 1. Learn to enjoy the ecstasy of literature.  
2. The select literary pieces will develop the confidence level of the learners.  
3. To get the social values.  
4. To know the importance of communication.  
5. Get sound knowledge in English.  
6. Trained to communicate well for business purpose. |
| 8 | Corporate Accounting | 1. Comprehend and apply the accounting process related corporate accounting  
2. Prepare final accounts for corporate entity.  
3. Understand the accounting standard and apply the same for corporate entity and amalgamation.  
4. Understand the difference of banking balance sheet and non-banking balance sheet  
5. Enhance the problem-solving skills and analytical skills in the accounting context.  
6. Enhance the facts on issue and redemption of share capitals |
|---|---|---|
| 9 | Business Mathematics and Statistics | 1. Utilize the concept of matrices, differential calculus to solve business problems  
2. Calculate and apply the measure of central tendency and dispersion in decision making.  
3. Evaluate the relationship and association between variables to formulate the strategy in business.  
4. Apply the concept of index numbers and trend analysis in business decisions.  
5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.  
6. To overcome on issues in the construction of index numbers |
| 10 | Environmental Studies | 1. Understand the ecosystem and its impact on human beings.  
2. Preserve the non – renewable energy and effectively utilize the renewable energy.  
3. Avoid the threats to biodiversity habitat loses.  
4. Prevent pollution in the environment  
5. Apply the laws relevant to the environment conservation  
6. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners  
7. Understand the ecosystem and its impact on human beings. |
<table>
<thead>
<tr>
<th>11</th>
<th>18ENU301</th>
<th>English – III</th>
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</thead>
<tbody>
<tr>
<td>1. Students learnt the basics and purposes of listening skill.</td>
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<td>2. Students will know the importance of speaking.</td>
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<td>3. Students developed the speaking skills on telephone, business and also in travel</td>
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<td>4. Learnt some effective vocabulary learning strategies.</td>
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<td>5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.</td>
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<tr>
<td>6. Students will have honed the skills of communication which is needed for business purpose.</td>
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<thead>
<tr>
<th>12</th>
<th>18CMU301</th>
<th>Cost Accounting</th>
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</thead>
<tbody>
<tr>
<td>1. Understand the cost concepts, types of costing methods and book keeping for cost accounting</td>
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<tr>
<td>2. Apply tools and techniques to calculate cost and solve the problems.</td>
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<tr>
<td>3. Select the best methods of costing by critically analyzing and apply the same to appropriate situation</td>
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<td>4. Communicate orally and in written the cost concepts</td>
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<td>5. Gain the lifelong learning of cost concepts and apply in the business environment.</td>
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<thead>
<tr>
<th>13</th>
<th>18CMU302</th>
<th>Income Tax Law and Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Formulate the Income Tax calculations by critically analyzing the assessee’s situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee</td>
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<td>4. Communicate orally and in written the Income tax computation under various income heads and deductions.</td>
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<td>5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.</td>
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<td>6. Prepare a statement of income for a person.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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</tbody>
</table>
| 18CMU303A   | Auditing and Corporate Governance | 1. Comprehend on the Concept of auditing, corporate governance and Corporate social responsibility (CSR)  
2. Recall the audit techniques, corporate governance and CSR practices.  
3. Apply lifelong the key learning of best auditing process, Corporate governance and CSR practices  
4. Communicate orally and in written form the auditing concept and techniques, Corporate governance and CSR concepts and practices in business.  
5. Familiar with the standards and laws pertaining to the auditing, Corporate Governance and CSR.  
6. Reminiscence with statistics on global reporting. |
| 18CMU303B   | Computerised Accounting System | 1. Comprehend on the knowledge of Tally, its features and its importance.  
2. Communicate orally and in written form the Features of Tally in capturing accounting procedures.  
3. Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.  
4. Familiarize on the incorporation of GST standards into accounting and computerized accounting process.  
5. Integrate accounting concepts and computer for effective decision making.  
6. Practical application of tally concepts in organizations. |
| 18CMU311A   | Auditing and Corporate Governance (practical) | 1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.  
2. Classify and apply vouching, verification and valuation technique to appropriate situation  
3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.  
4. Communicate orally and in written form about the findings and solution.  
5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.  
6. Reminiscence with statistics on global reporting. |
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<tr>
<th>Course Code</th>
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<th>Objectives</th>
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</table>
| 18CMU311B    | Computerised Accounting System (practical) | 1. Familiarize on the accounts heads, vouching, inventory valuations, TDS and Pay roll process available in the accounting software  
2. Classify the items under items heads  
3. Generate the financial Reports, TDS and pay roll reports and evaluate the output.  
4. Communicate the outputs in written form identifying the objective and outcome of each exercise.  
5. To apply the utilization of computerised system as a lifelong learning.  
6. Practical application of tally concepts in organizations. |
| 18ENU401     | English – IV                        | 1. Students have acquired proficiency in communication.  
2. Students have become adept in written communication and presentation skills.  
3. Practice the skill of writing in English and that of public speaking.  
4. Establish and maintain social relationships.  
5. Develop communication skills in business environment.  
6. Refine communication competency through LSRW skills. |
| 18CMU401     | Research Methodology                | 1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing  
2. Analyse the research problem and design the blue print to capture data and analyse the same using appropriate statistical techniques and apply the learning lifelong.  
3. Critically formulate the research design and sampling design suitable for the problem.  
4. Communicate orally and written for the research problem, research design, sampling techniques.  
5. Design a report to communicate the findings.  
6. Provide suggestion to make business decision |
| 18CMU402     | Indirect Taxation                   | 1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.  
2. Comprehend and compute GST liabilities.  
3. Know the procedure to register GST and apply GST provisions to business situations.  
4. Communicate orally and in written form the indirect taxations concepts and provisions. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>18CMU403A</td>
<td>Financial Analysis and Reporting</td>
<td>5. Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application.</td>
</tr>
<tr>
<td>18CMU403B</td>
<td>Excel for Business</td>
<td>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</td>
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<td>2. Understand and apply tools and techniques to analyse the financial statement analysis.</td>
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<td>3. Critically evaluate the results of the tools applied, interpret the result.</td>
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<td>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</td>
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<td>5. Preparation of statement of cash and fund flow.</td>
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<td>6. Preparation of Cash flow and fund flow statements.</td>
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<tr>
<td>18CMU411</td>
<td>Research Methodology (Practical)</td>
<td>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</td>
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<td>2. Analyse the research problem and design the instruments to capture data</td>
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<td>3. Analyse the same using appropriate statistical techniques, and apply the learning lifelong.</td>
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<td>4. Critically evaluate the appropriate scales and measurement to be used for capturing data.</td>
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<td>5. Communicate in written form and prepare report to support decision making.</td>
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<td>6. Work in team and exhibit leadership skills.</td>
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</tbody>
</table>
| 24 | 18CMU412 | Indirect Taxation (Practical) | 1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.  
2. Know the procedure to register GST and apply GST provisions to business situations.  
3. Communicate orally and in written form the indirect taxation concepts and provisions.  
4. Familiar with the standards and laws pertaining GST and customs and apply the knowledge lifelong.  
5. Application of GST provisions for business concerns.  
6. Comprehend and compute GST liabilities. |
| 25 | 18CMU413A | Financial Analysis and Reporting (Practical) | 1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the elements and users of the financial statements for the decision making.  
2. Understand and apply tools and techniques to analyse the financial statement analysis.  
3. Critically evaluate the results of the tools applied, interpret the result.  
4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.  
5. Utilize the knowledge of financial statement analysis for lifelong.  
| 26 | 18CMU413B | Excel for Business (Practical) | 1. Create and format the data in excel sheet  
2. Utilize all the inbuilt, functions and formulas and analyse the data.  
3. Critically analyse the data using the what-if, solver and pivot functions.  
4. Communicate the outputs in written form identifying the objective and outcome of each exercise.  
5. Apply the practice of utilization of spreadsheets lifelong learning for data analysis and decision making.  
6. Use shortcut methods in spreadsheet |
| 27 | 17CMU501A | Human Resource Management | 1. Understand the HR environment in India and human resource functions within organizations  
2. Plan human resources requirement and formulate HR policy of the organisation with regard to recruitment, selection, training and career planning.  
3. Appraise the employee’s performance and formulate compensation policy which helps to make organizational excellence. |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Learning Outcomes</th>
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<tbody>
<tr>
<td>17CMU501B</td>
<td>Indirect Tax Law</td>
<td>1. Understand the Concept of indirect taxes emphasizing VAT and customs law.</td>
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<td>2. Learn and compute the Taxation under the constitution.</td>
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<td>3. Know how to register CST and apply the CST provisions.</td>
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<td>4. Communicate orally and in written form the indirect taxations concepts and provisions.</td>
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<td>5. Be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.</td>
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<td>6. To have an understanding of custom duties</td>
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<tr>
<td>17CMU502A</td>
<td>Principles of Marketing</td>
<td>1. Understand the Concept of marketing, and 4Ps of Marketing</td>
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<td>2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing</td>
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<td>3. Apply the marketing concepts and skills lifelong.</td>
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<td>4. Apply the marketing strategies of a company’s effectively.</td>
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<td>5. To be familiar in behavior of consumer in related to market and to take decision effectively.</td>
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<td>6. To implement the correct promotion strategies.</td>
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<tr>
<td>17CMU502B</td>
<td>Banking and Insurance</td>
<td>1. Understand the Concept of banking operations, functions, risk associated with and law pertaining to banking functions,</td>
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<td></td>
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<td>2. Comprehend on the Indian banking system, its regulatory body and key macro indicators related to banks that affect the economy.</td>
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<td>3. Communicate orally and in written form the understanding of banking operations, functions, risk associated with and law pertaining to banking functions</td>
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<td>4. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.</td>
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<td>5.</td>
<td>Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.</td>
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<td>6.</td>
<td>To be familiar in accessing different forms of Internet Banking globally and able to access its benefit</td>
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<tr>
<td>31</td>
<td><strong>17CMU503A</strong> Entrepreneurship</td>
<td></td>
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<tr>
<td>1.</td>
<td>Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>2.</td>
<td>Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>3.</td>
<td>Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</td>
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<td>4.</td>
<td>Analyse the case studies and try to apply the theoretical learning into lifelong practice.</td>
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<td>5.</td>
<td>Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.</td>
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<td>6.</td>
<td>Work in team and exhibit leadership skills</td>
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<tr>
<td>32</td>
<td><strong>17CMU503B</strong> Advertising</td>
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<tr>
<td>1.</td>
<td>Knowing the concepts of advertising.</td>
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<tr>
<td>2.</td>
<td>Getting the details about the various types of advertising</td>
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<td>3.</td>
<td>Understanding the motivational aspects of salesmen</td>
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<td>4.</td>
<td>Understanding the concept of sales force management</td>
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<td>5.</td>
<td>Knowing about the social effects of advertising</td>
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<td>6.</td>
<td>Knowing about the promotional strategy.</td>
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| 33   | 17CMU504A  | Principles of Micro Economics | 1. Apply the demand and supply concept in managerial decisions  
2. Formulate the pricing strategies based on the market structure  
3. Gain knowledge on the market structure and price determination  
4. Understand the importance of macroeconomic indicators like National income, GDP, Inflation etc.  
5. Understand the concepts of Monetary policy, Balance of payment and Money supply  
6. Understand the impact of monetary policy, money supply and Balance of payments on running a business. |
| 34   | 17CMU504B  | Business Ethics               | 1. Making the concept, process and importance of Business ethics.  
2. Gaining the knowledge on Ethical Issues in Human Resource Management  
3. Improving the ethical behaviour of business, Ethical Issues in Marketing Strategy  
4. Giving the basics of communication reports, tenders and various correspondence of a company.  
5. Understanding the concept of Ethical Issues in Finance  
6. Imparting the students with enhanced Corporate Social Responsibility (CSR) |
| 35   | 17CMU511A  | Principles of Marketing- Practical | 1. Helping the students to get in-depth knowledge on Marketing Segmentation  
2. Helping to know about the proper Distribution channels  
3. Helping the students to identify the media of Advertisement  
4. Preparing and Presenting the Development of Market Segmentation for any FMGC products  
5. Giving a Presentation of the Selection of distribution channel for Baby Product  
6. To Present in which media of Advertisement will you select for Cosmetic products |
| 36   | 17CMU511B  | Banking and Insurance - Practical | 1. Imparting the knowledge about the basic principles of the banking and insurance |
| 17CMU601A | Management Accounting | 1. Explain nature and scope of management accounting  
2. Evaluate Costing systems, cost management systems, budgeting systems and performance measurement systems  
3. Extend Classification of ratios, capital structure and leverage.  
5. Prepare management reports by using funds flow and cash flow statement.  
6. Prepare the Financial Statement under the defined Accounting standard. |
|---|---|---|
2. Providing computer skills and knowledge for commerce students and to enhance the Student understands of usefulness of information technology tools for business operations.  
3. Learning the concept of Word Processing and Printing Documents.  
4. Preparing the Presentations with Creating Business Presentations using above facilities  
5. Understanding the principles of creating Spreadsheet and its Business Applications  
6. Developing the skills in analyzing the usability of a website. |
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 17CMU602A   | Office Management and Secretarial Practices | 1. Understanding the concept office and office management.  
2. Knowing the different finance sources of business and location of the business.  
3. Familiarizing the students with the activities in a modern office.  
4. Imparting the students about the working environment, the tools and equipment’s used in office.  
5. Understanding the concept and procedure about banking facilities.  
6. Demonstrating the importance and functions of Modern Office Equipments. |
| 17CMU602B   | Fundamentals of Investment | 1. Understanding the Concept and procedures of fundamentals of investment.  
2. Familiarizing the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.  
3. Knowing the concept of various types of bonds/  
4. Evaluate the appropriate alternatives techniques for Portfolio Analysis and Financial Derivatives  
5. Communicate in oral and written form of Technical Analysis and Efficient Market  
6. Understand the concept and Role of SEBI and Stock Exchanges in Investor Protection |
| 17CMU603A   | Personal Selling and Salesmanship | 1. Understand the Concept of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.  
2. Communicate orally and in written form the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.  
3. Apply the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and controlling lifelong practice.  
4. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.  
5. Communicate in oral and written form and prepare report  
6. Work in team and exhibit leadership skills |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
</table>
| 17CMU603B   | Consumer Protection | 1. Familiarizing the students with their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.  
2. Comprehending the business firms’ interface with consumers and the consumer related regulatory and business environment.  
3. Understanding the Consumer Protection Act, 1986 (CPA) and their Objectives and Basic Concepts.  
5. Familiarizing the students with the concept of Grievance Redress Mechanism under the Consumer Protection Act, 1986.  
6. Understanding the concept of Industry Regulators and Consumer Complaint Redress Mechanism. |
| 17CMU604A   | Indian Economy | 1. Enabling the student to grasp the major economic problems in India and their solutions.  
2. Providing an understanding of modern tools of macro-economic analysis and policy framework.  
3. Enlightening the students knowledge in Basic Issues and features of Indian Economy.  
4. Communicating orally and in written form Concept of Sectoral Trends and Issues.  
5. Having in-depth knowledge on Policies for restructuring agrarian relations and for regulating concentration of economic power.  
6. Understanding the importance of Inflation, Unemployment and Labour market. |
| 17CMU604B   | Retail Management | 1. Understand the features of Retailing.  
2. Knowledge in the theories of Retail Development.  
3. Knowledge in global Retail Markets.  
4. Communicate orally and in written form Concept of management in retail business.  
5. Implement the right retail strategies to make success the retail business.  
6. Follow and take decisions related to Servicing the Retail Customer. |
|   | 17CMU611A | Management Accounting - Practical | 1. Preparing various types of inventory statements  
2. Preparing the bank reconciliation statement  
3. Preparing the various types of ratio analysis  
4. Preparing the Cash flow statement and Fund flow statement  
5. Creating the stock group and stock items and enter the vouchers  
6. Preparing the various types of reports |
|---|---|---|---|
|   | 17CMU611B | Computer Application in Business – Practical | 1. Knowing the MS-word usage and its commands  
2. Familiar with MS-Excel and its function  
3. Aware of the MS-power point  
4. Knowing about the usage of MS-Access.  
5. Preparing documents and reports for the organization  
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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the course</th>
<th>Course Outcome</th>
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</table>
| 1     | 19CMP101    | Managerial economics     | 1. Apply the economic way of thinking to individual decisions and business decisions  
2. Measure the responsiveness of consumers’ demand to changes in the price of a goods or service, and understand how prices get determined in markets,  
3. Understand the different costs of production and how they affect short and long run decisions and derive the equilibrium conditions for cost minimization and profit maximization  
4. Demonstrate an understanding of monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run and Critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.  
5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.  
6. Understand and exhibit the Market Competition and Price structures |
| 2     | 19CMP102    | Managerial accounting    | 1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.  
2. Comprehend on the contemporary issues relevant to accounting concepts.  
3. Analyse the alternatives using appropriate tools and techniques.  
4. Solve the problems and take decisions based on the result.  
5. Communicate orally and in written form the concepts and solutions.  
6. Realize the preparation of Budget |
<p>| 3     | 19CMP103    | Statistical analysis     | 1. Understand the basic statistical tools and techniques and its application in business decision making. |</p>
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<tr>
<td>1.</td>
<td>Understand the international Reporting standards and its importance</td>
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<td>2.</td>
<td>Prepare the accounts for holding company.</td>
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<td>3.</td>
<td>Formulate accounts for corporate restructuring, liquidation and prepare the Voyage accounts</td>
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<td>4.</td>
<td>Understand the importance of Human Resource Accounting and Price level changes.</td>
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<td>5.</td>
<td>Demonstrate</td>
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<td>6.</td>
<td>Demonstrate capabilities</td>
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<th>4.</th>
<th>19CMP104</th>
<th>Advanced corporate accounting</th>
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<tr>
<td>1.</td>
<td>Perform basic statistical estimation and hypothesis testing for interpret the results.</td>
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<td>2.</td>
<td>Know how to specify, estimate, and use statistical models to predict and obtain reliable forecasts.</td>
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<td>3.</td>
<td>Develop an ability to analyse and interpret the collected data to provide meaningful information in making management decisions</td>
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<td>4.</td>
<td>Understand the Aggregate expenditure method</td>
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<td>5.</td>
<td>Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the discipline of statistics.</td>
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<tr>
<th>5.</th>
<th>19CMP105A</th>
<th>Indian financial system</th>
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<tbody>
<tr>
<td>1.</td>
<td>Analyse behavior issues in the context of the organizational behavior theories and concepts.</td>
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<tr>
<td>2.</td>
<td>Assess the behavior of the individuals and groups in organization by applying personality, motivation and learning theories.</td>
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<td>3.</td>
<td>Manage team and resolve conflict arising between the members.</td>
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<td>4.</td>
<td>Explain how organizational change and culture affect working relationships within organizations.</td>
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<tr>
<td>5.</td>
<td>Realize the Individual Behaviour and Personality</td>
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<tr>
<td>6.</td>
<td>Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</td>
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<th>6.</th>
<th>19CMP105B</th>
<th>Organizational behaviour</th>
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<tbody>
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<td>1.</td>
<td>Analyse behavior issues in the context of the organizational behavior theories and concepts.</td>
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<tr>
<td>2.</td>
<td>Assess the behavior of the individuals and groups in organization by applying personality, motivation and learning theories.</td>
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<td>Manage team and resolve conflict arising between the members.</td>
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<td>5.</td>
<td>Realize the Individual Behaviour and Personality</td>
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<tr>
<td>6.</td>
<td>Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</td>
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<tr>
<th>7.</th>
<th>19CMP105C</th>
<th>Consumer behaviour</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Understand the importance of Culture, Subculture, Social Class, Reference Groups and Family Influences in Consumer Behaviour.</td>
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<td>Course Title</td>
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| 8  | 19CMP106 | Corporate law                       | 1. Identify the basic legal principles behind Corporate Incorporation and Management, Oppression & Mismanagement and Investigation, Corporate Liquidation, Corporate Governance and CSR and its application.  
2. Understand the relevance of corporate law in economic and social context.  
3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in corporate.  
4. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment related to corporate.  
5. To communicate orally and in written format the corporate law.  
6. Online registration and online filing process of documents |
| 9  | 19CMP111 | Computer application for accounting (practical) | 1. Understand the different accounting heads and its importance  
2. Create vouchers and ledgers by understanding the reason for posting under different heads  
3. Calculate valuation of assets using the software  
4. Prepare the financial statements and analyse the financial statement using the option of ratio analysis  
5. Exhibit communication skills to communicate the output derived from the program.  
6. Preparing the various types of reports |
<table>
<thead>
<tr>
<th>10</th>
<th>19CMP201</th>
<th>Corporate finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Understand the role of a financial manager, and their role in taking decisions professionally.</td>
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<tr>
<td>2.</td>
<td>Demonstrate knowledge and compute value of money over time and apply the concept to Evaluate the business proposal applying capital budgeting techniques.</td>
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<tr>
<td>3.</td>
<td>Compute the cost of capital and financial leverage to estimate the optimal capital structure.</td>
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<td>4.</td>
<td>Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.</td>
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<tr>
<td>5.</td>
<td>Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions.</td>
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<tr>
<td>6.</td>
<td>Apply the concept to Evaluate the business proposal applying capital budgeting techniques.</td>
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<tr>
<th>11</th>
<th>19CMP202</th>
<th>Operations research</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Understand the principles and techniques of Operations Research and their applications in decision-making.</td>
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<tr>
<td>2.</td>
<td>Formulate linear programming (LP) models and understand the cost minimization and profit maximization concepts.</td>
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<tr>
<td>3.</td>
<td>Apply mathematical methods for large-scale transportation, assignment models and inventory models.</td>
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<tr>
<td>4.</td>
<td>Realize and apply mathematical techniques in getting the best possible solution to a problem involving limited resources.</td>
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<tr>
<td>5.</td>
<td>Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills.</td>
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<tr>
<td>6.</td>
<td>Course concentrates on Linear programming, transportation model, Queuing theory and Inventory.</td>
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<tr>
<td>12</td>
<td>19CMP203</td>
<td>Applied cost accounting</td>
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<tr>
<td></td>
<td></td>
<td>1. Explain the core concepts of costing, costing types and its importance in managing a business</td>
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<td></td>
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<td>2. Develop a conceptual framework of costing and to acquaint the participants with the tools, techniques and process cost reduction and control in the realm of decision making</td>
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<tr>
<td></td>
<td></td>
<td>3. Compute using different costing methods.</td>
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<td></td>
<td></td>
<td>4. Demonstrate capabilities of teamwork, problem-solving and critical thinking</td>
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<td></td>
<td></td>
<td>5. Communication skills related to finance decisions.</td>
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<thead>
<tr>
<th>13</th>
<th>19CMP204</th>
<th>Financial markets and institutions</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Comprehend on the concept financial markets, instruments and financial institution and its role in economic development</td>
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<tr>
<td></td>
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<td>2. Understand the regulatory bodies governing the functioning of financial markets and financial institution</td>
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<td>3. Obtain the capacity to do lifelong learning on financial markets, instruments, financial institution and its applications.</td>
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<td>4. To communicate orally and in written format about the financial markets and institutions</td>
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<td></td>
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<td>5. The course includes Money Market, Money Market Instruments, Capital Market, Depository System and various types of Financial Institutions</td>
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<tr>
<td></td>
<td></td>
<td>6. Course includes Money Market, Money Market Instruments, Capital Market, Depository System and various types of Financial Institutions</td>
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<tr>
<th>14</th>
<th>19CMP205A</th>
<th>Security analysis and portfolio management</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1. Choose the appropriate investment avenues based on the individual risk return profile</td>
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<tr>
<td></td>
<td></td>
<td>2. Calculate the intrinsic value and evaluate the performance based on risk-return</td>
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<td></td>
<td>3. Select the security based on the fundamental and technical analytical tools</td>
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<td>4. Evaluate the performance of the portfolio using the different measures</td>
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<td></td>
<td></td>
<td>5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to investment decisions.</td>
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<td></td>
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<td>6. Demonstrate capabilities of diversification risk</td>
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<tr>
<td>Code</td>
<td>Course Title</td>
<td>Objectives</td>
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</tbody>
</table>
| 15     | Human resource management           | 1. Assess the job analysis for a profile and understand its linkage with HR planning  
2. Evaluate the training needs and draft a training programme.  
3. Understand the compensation and reward system applicable to the industry based and understand its linkage with performance management  
4. Understand and apply the appropriate employee relations measures.  
5. Understand the HR functions and latest developments in the field of HR and effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to different audiences.  
| 16     | Advertising and sales promotions    | 1. Knowing the concepts of advertising.  
2. Getting the details about the various types of advertising  
3. Understanding the motivational aspects of salesmen  
4. Understanding the concept of sales force management  
5. Knowing about the social effects of advertising  
6. Knowing about the promotional strategy. |
3. Formulate the Income Tax calculations by critically analyzing the assessee’s situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee  
4. Communicate orally and in written the Income tax computation under various income heads and deductions.  
5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.  
6. Familiar with the laws pertaining to the Income Tax and its apply it lifelong. |
| 18     | Advanced excel for business (practical) | 1. Apply advanced formulas to lay data in readiness for financial analysis  
2. Use advanced techniques for financial report visualizations |
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<tr>
<td>3.</td>
<td>Leverage on various methodologies of summarizing financial data.</td>
<td>1. Understand the concept of software engineering, software requirements and software project management.</td>
</tr>
<tr>
<td>4.</td>
<td>Understand and apply Sensitivity (“What-if”) analysis models like Goal Seek.</td>
<td>2. Apply the concept in software project management.</td>
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<tr>
<td>5.</td>
<td>Understand and apply Scenarios; Excel models for financial decision-making.</td>
<td>3. Understand and apply the metrics to successfully plan and implement the software project.</td>
</tr>
<tr>
<td>6.</td>
<td>Exhibit communication skills to communicate the output derived from the program.</td>
<td>4. Communicate orally and in written form the application of the understanding of software engineering.</td>
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**19** 18CCP301 Software models and engineering

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<tr>
<td>1.</td>
<td>Understand the concept of software engineering, software requirements and software project management.</td>
</tr>
<tr>
<td>2.</td>
<td>Apply the concept in software project management.</td>
</tr>
<tr>
<td>3.</td>
<td>Understand and apply the metrics to successfully plan and implement the software project.</td>
</tr>
<tr>
<td>4.</td>
<td>Communicate orally and in written form the application of the understanding of software engineering.</td>
</tr>
<tr>
<td>5.</td>
<td>Communicate orally and in written form the application of the understanding of software requirements.</td>
</tr>
<tr>
<td>6.</td>
<td>Communicate orally and in written form the application of the understanding of software project management.</td>
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**20** 18CCP302 Business research methods and techniques

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<tr>
<td>1.</td>
<td>Assess the best suitable research type and formulate the research objective for the business problem.</td>
</tr>
<tr>
<td>2.</td>
<td>Formulate the suitable research designs and select appropriate sampling techniques for the research.</td>
</tr>
<tr>
<td>3.</td>
<td>Select the appropriate data collection method for solving the business issue.</td>
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<td>4.</td>
<td>Decide the appropriate measurement scale for designing the instrument for data collection.</td>
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<td>5.</td>
<td>Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.</td>
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<tr>
<td>6.</td>
<td>Demonstrate capabilities of team work, problem-solving, critical thinking, and communication skills and design a suitable research report based on the ethical norms of research.</td>
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**21** 18CCP303 Indirect taxation

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<tr>
<td>1.</td>
<td>Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.</td>
</tr>
<tr>
<td>2.</td>
<td>Comprehend and compute GST liabilities.</td>
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<tr>
<td>3.</td>
<td>Know the procedure to register GST and apply GST provisions to business situations.</td>
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<td>4.</td>
<td>Communicate orally and in written form the indirect taxations concepts and provisions.</td>
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<td>18CCP305A</td>
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<td>4.</td>
<td>Exhibit communication skills to communicate the output derived from the program.</td>
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<tr>
<td>5.</td>
<td>Understand the date and time handling functions</td>
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<tr>
<td>6.</td>
<td>Exhibit to develop an application to create inventory management system</td>
</tr>
<tr>
<td>27</td>
<td>18CCP312</td>
</tr>
<tr>
<td>1.</td>
<td>Create datasheet and enter the data</td>
</tr>
<tr>
<td>2.</td>
<td>Compute descriptive statistics using the package and graphically represent the data.</td>
</tr>
<tr>
<td>3.</td>
<td>Perform univariate and bivariate analysis in the software package.</td>
</tr>
<tr>
<td>4.</td>
<td>Perform multivariate analysis in the software package.</td>
</tr>
<tr>
<td>5.</td>
<td>Perform the correlation analysis</td>
</tr>
<tr>
<td>6.</td>
<td>Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output</td>
</tr>
<tr>
<td>28</td>
<td>18CCP401</td>
</tr>
<tr>
<td>1.</td>
<td>Understand the Concept of Digital marketing and digital marketing tools.</td>
</tr>
<tr>
<td>2.</td>
<td>Learn tools and utilize the tools of digital marketing</td>
</tr>
<tr>
<td>3.</td>
<td>Understand the linkage of digital marketing and analytics</td>
</tr>
<tr>
<td>4.</td>
<td>Exhibit the concept of Online Reputation Management</td>
</tr>
<tr>
<td>5.</td>
<td>Understand the Online Marketing Tools</td>
</tr>
<tr>
<td>6.</td>
<td>Communicate orally and in written form the Concept of Digital marketing and digital marketing tools</td>
</tr>
<tr>
<td>29</td>
<td>18CCP402</td>
</tr>
<tr>
<td>1.</td>
<td>Understanding the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</td>
</tr>
<tr>
<td>2.</td>
<td>Communicating orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</td>
</tr>
<tr>
<td>3.</td>
<td>Applying the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</td>
</tr>
<tr>
<td>4.</td>
<td>Initiating the required skills for entrepreneurial development.</td>
</tr>
<tr>
<td>5.</td>
<td>Helping students understand the process of establishing and developing an enterprise</td>
</tr>
<tr>
<td>6.</td>
<td>Making the students Small Business as seed bed of Entrepreneurship</td>
</tr>
<tr>
<td>30</td>
<td>18CCP411</td>
</tr>
<tr>
<td>1.</td>
<td>Understand the Concept of Digital marketing and digital marketing tools.</td>
</tr>
</tbody>
</table>
| 31 | 1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection. | 2. Learn tools and utilize the tools of digital marketing.  
3. Understand the linkage of digital marketing and analytics.  
4. Exhibit the concept of Online Reputation Management.  
5. Understand the Online Marketing Tools.  
6. Communicate orally and in written form the Concept of Digital marketing and digital marketing tools. |
| 18CCP491 Project | 2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.  
3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.  
4. Apply the theoretical and practical learning of doing research into lifelong practice.  
5. Communicate in oral and written form and prepare report.  
6. Work in team and exhibit leadership skills. |
# Course: B.Sc. Biochemistry

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1.     | 19LSU101    | Language -I          | 1. தமிழில் பொருள் மொழிப் பட்டியல் (நூற்றாண்டுப் போல்) முழுமையாக மொழிப்படுத்தவும், ஒன்றுவிட்டு மொழி செய்வதும், குறிப்பிட்டு பொருள் மொழிப் பட்டியல் குறிப்பிட்டு மொழிப்படுத்தவும் முழுமையாக மொழிப்படுத்தவும்.  
2. குறிப்பிட்டு பொருள் மொழி பட்டியலில் பெறும் முழுமையாக மொழிப்படுத்தவும் அுருவாக்கும் மொழிப்படுத்தவும், தொடர்புப் பங்களைக் கொண்டதும்.  
3. தமிழில் பொருள் மொழிப் பட்டியல்: தமிழில் பொருள் மொழிப் பட்டியல் அடையும் பங்களைக் கொண்டதும் தொடர்புப் பங்களைக் கொண்டதும்.  
4. மொழிப்படுத்தக்கூறு குறிப்பிட்டு பொருள் மொழிப் பட்டியல், குறிப்பிட்டு மொழிப்படுத்தவும் மொழிப்படுத்தவும் முழுமையாக மொழிப்படுத்தவும்.  
5. குறிப்பிட்டு பொருள் மொழிப் பட்டியல் மொழிப்படுத்தப்பகுதிகளாகக் குறிப்பிட்டு பொருள் மொழிப் பட்டியல் குறிப்பிட்டு பொருள் மொழிப்படுத்தவும் முழுமையாக மொழிப்படுத்தவும்.  
6. பொருள் மொழிப் பட்டியல் குறிப்பிட்டு மொழிப் பட்டியல் குறிப்பிட்டு பொருள் மொழிப் பட்டியல் குறிப்பிட்டு பொருள் மொழிப் பட்டியல்

| 2.     | 19ENU101    | English              | 1. Develop the knowledge of interpersonal skills  
2. Establish and maintain social relationships  
3. Genres of literature will give moral values of life  
4. Develop communication skills in business environment  
5. Communication skills will get developed  
6. Develop to have language competence |
|--------|-------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.     | 19BCU101    | Molecules of Life    | 1. Recognize water as a universal solvent and elixir of life by knowing its importance  
2. Identify the properties and classification of carbohydrates  
3. Recall the role of various lipids in bio-membrane including signal transduction  
4. Categorize the amino acids and know their properties  
5. Differentiate the structure, properties and functions of DNA and RNA  
6. List the functions and deficiency disease of fat and water soluble vitamins |
| 4.     | 19BCU102    | Cell biology         | 1. Differentiate the prokaryotic and eukaryotic cell  
2. Understand the principle behind studying the cell morphology using various microscope  
3. Identify the structure and functions of each organelle in cell |
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<tr>
<th>Table Cell 1</th>
<th>Table Cell 2</th>
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<tbody>
<tr>
<td>4. Recognise the mechanism behind the protein sorting and transport to their destinations like lysosome, mitochondria and chloroplast</td>
<td>5. Maintenance of cytoskeleton structure and function of micro, macro and intermediary filaments</td>
<td>6. Enumerate the phases of cell cycle, events in cell division and mechanism of cell death</td>
</tr>
<tr>
<td><strong>5. 19BCU103 Chemistry-I</strong></td>
<td><strong>1. Understand the molecular orbital theory, preparation and properties of inorganic compounds</strong></td>
<td><strong>2. Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds</strong></td>
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<td></td>
<td><strong>3. Have knowledge about important industrial chemicals like silicones, fuel gases</strong></td>
<td><strong>4. Know the classes of fertilizers and their impact on environment</strong></td>
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<td><strong>5. Understand the elements of photochemistry, chemical kinetics and chromatography.</strong></td>
<td><strong>6. Understand about the dyes, chemotherapy and vitamins</strong></td>
</tr>
<tr>
<td><strong>6. 19BCU111 Molecules of Life- Practical</strong></td>
<td><strong>1. Gain knowledge on lab safety</strong></td>
<td><strong>2. Prepare reagents and solutions</strong></td>
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<td><strong>3. Understand the basis of buffer preparation</strong></td>
<td><strong>4. Understand the principle and working procedure behind chromatographic separations</strong></td>
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<td><strong>5. Understand the principle and working procedure behind staining techniques</strong></td>
<td><strong>6. Understand the principle and working procedure behind colorimetric techniques</strong></td>
</tr>
<tr>
<td><strong>7. 19BCU112 Cell biology – Practical</strong></td>
<td><strong>1. Identify the spotters of light microscopy</strong></td>
<td><strong>2. Be able to visualize the cells</strong></td>
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<tr>
<td></td>
<td><strong>3. Use the phase contrast microscopy at appropriate magnifications</strong></td>
<td><strong>4. Identify the cells using staining techniques</strong></td>
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<td><strong>5. Interpret various stages of cell division</strong></td>
<td><strong>6. Count the cells manually using hemocytometer</strong></td>
</tr>
<tr>
<td><strong>8. 19BCU113 Chemistry Practical- I</strong></td>
<td><strong>1. Perform preliminary tests for identification of an organic compound</strong></td>
<td><strong>2. Perform and detect the elements present in the given compound</strong></td>
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<tr>
<td></td>
<td><strong>3. Identify and differentiate between aromatic and aliphatic compound</strong></td>
<td><strong>4. Identify different functional groups and its nature</strong></td>
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<tr>
<td></td>
<td><strong>5. Perform confirmatory test for aldehydes, ketones, amines and amides</strong></td>
<td><strong>6. Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds.</strong></td>
</tr>
</tbody>
</table>
| **9. 19LSU 201 Language – II** | **1. கிருமியை குறிப்பிட்டு பெருக்கப்பட்டு இருந்து கிருமியை தவற்படுத்தும் நிலைகளில் குற்றம் குறிப்பிட்டு பெருந்துக் கிருமியை** | **2. குற்றானால் குறக்கும் குறக்கில்லையும் குறக்கில்லையும் குறக்கில்லையும் குறக்கில்லையும் குறக்கில்லையும் குறக்கில்லையும் குறக்கில்லையும் குறக்கில்லையும்
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Topics</th>
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</thead>
</table>
| 10. 19BCU201 | Proteins | 1. Build on their understanding of proteins  
2. Use different molecular techniques used for separation of proteins  
3. Use different molecular techniques used for characterization of proteins  
4. Understand the three dimensional structure of proteins using computational tools  
5. Identify the biological significance of proteins  
6. Use appropriate technique during their project work |
| 11. 19BCU202 | Enzymes | 1. Understand the basic concepts on enzymes  
2. Relate the initial velocity and substrate concentration of enzymes and be able to understand the kinetics of inhibition reactions  
3. Understand the basis of enzyme inhibitor drugs  
4. Be able to understand the regulation pattern of various enzymes  
5. Relate the regulation pattern of enzymes for its application in health and diseases  
6. Understand the application of enzymes as marker in various disease conditions |
| 12. 19BCU203 | Chemistry-II | 1. The metallurgy of metals and the theories of coordination compounds and  
2. The industrial importance of EDTA, haemoglobin and chlorophyll.  
3. The concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.  
4. The preparation, classifications and properties of amino acids, proteins and carbohydrates.  
5. The concepts of first and second laws of thermodynamics  
6. The fundamentals of electrochemistry |
| 13. 19BCU211 | Proteins – Practical | 1. Perform qualitative analysis of proteins  
2. Quantify the amount of protein in the given sample  
3. Determine isoelectric point of given protein  
4. Separate the protein using ammonium sulphate method |
<table>
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<tr>
<th>Course Code</th>
<th>Subject Title</th>
<th>Course Description</th>
</tr>
</thead>
</table>
| 14. 19BCU212 | Enzymes-Practical | 1. Identify the source of enzymes and study the extraction and partial purification of enzymes  
2. Identify the optimum pH required for the maximum activity of a given enzyme  
3. Identify optimum substrate concentration required for the maximum activity of a given enzyme  
4. Identify the optimum temperature required for the maximum activity of a given enzyme  
5. Analyse the inhibition pattern by various competitive inhibitors for the enzyme acid phosphatase purified from germinated mung bean  
6. Assay the activity of Lactate dehydrogenase and glucose – 6 – phosphate dehydrogenase enzymes |
| 15. 19BCU213 | Chemistry Practical-II | 1. Estimate sodium carbonate and sodium hydroxide using standards  
2. Estimate sulphuric acid using standard oxalic acid  
3. Estimate potassium permanganate by alkalimetry method  
4. Estimate ferrous sulphate using stand Mohr’s salt  
5. Estimate oxalic acid using standard ferrous sulphate  
6. Estimate calcium using direct method |
| 16. 19AEC201 | Environmental Studies | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Understand the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. |
| 17. 18BCU301 | Metabolism of Carbohydrates and Lipids | 1. Students are able to understand the breakdown of macromolecules like carbohydrate and lipids.  
2. Recognise the energy production pathways like glycolysis, glycogenolysis and TCA cycle.  
3. Interpret the central role of TCA cycle in energy metabolism.  
4. Relate the Calvin cycle with the synthesis of starch and sucrose and integration of carbohydrate metabolism in plant  
5. Understand the energy requirement and energy balance through glucose homeostasis  
6. Relate the interdependence of metabolic pathways |
| 18.  | 18BCU302 | Metabolism of Amino acids and Nucleic acids | 1. Identify basic structures, names, and properties of nucleic acids  
2. Demonstrate overview of amino acid metabolism and catabolism of amino acids  
3. Understand the chemical logic of metabolic pathways  
4. Recognize and understand basic mechanisms of pathway regulation  
5. Understand the central dogma concept  
6. Understand the basis of amino acid and nucleic acid disorders  |
| 19.  | 18BCU303 | Chemistry-I | 1. Understand the molecular orbital theory, preparation and properties of inorganic compounds  
2. Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds.  
3. Have knowledge about important industrial chemicals like silicones, fuel gases.  
4. Know the classes of fertilizers and their impact on environment.  
5. Understand the elements of photochemistry, chemical kinetics and chromatography.  
6. Understand about the dyes, chemotherapy and vitamins |
| 20.  | 18BCU311 | Metabolism of Carbohydrates and Lipids – Practical | 1. Use different qualitative methods to estimate glucose  
2. Use different quantitative methods to estimate glucose  
3. Perform fermentation techniques  
4. Understand the quantitative analysis of enzymes involved in carbohydrate metabolism  
5. Isolate lipid from the given sample  
6. Estimate enzymes involved in lipid metabolism |
| 21.  | 18BCU312 | Metabolism of Amino acids and Nucleic acids- Practical | 1. Assay clinically relevant transaminases  
2. Assess the levels of urea, uric acid and creatinine in urine sample using qualitative methods  
3. Assess the levels of urea, uric acid and creatinine in urine sample using quantitative methods  
4. Interpret the results on amino acids and nucleic acids in clinical cases  
5. Understand case studies related to amino acid disorders  
6. Understand case studies related to nucleic acid disorders |
| 22.  | 18BCU313 | Chemistry Practical - I | 1. Perform preliminary tests for identification of an organic compound  
2. Perform and detect the elements present in the given compound  
3. Identify and differentiate between aromatic and aliphatic compound  
4. Identify different functional groups and its nature  
5. Perform confirmatory test for aldehydes, ketones, amines and amides  
6. Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds. |
2. Prepare SOPs  
3. Detect radioisotopes  
4. Interpret virtual lab experiments |
<table>
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<tr>
<th>No.</th>
<th>Code</th>
<th>Course Title</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>24.</td>
<td>18BCU304B</td>
<td>Concepts in Genetics</td>
<td>1. Understand the principles and concepts of genetics</td>
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<td>2. Understand the basis of genetic disorders</td>
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<td>3. Comprehend different types of mutations (inversions, deletions, duplications and translocations)</td>
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<td>4. Understand the structure-function relationship of a specific gene</td>
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<td>5. Use appropriate model systems to study hereditary concepts</td>
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<td>6. Perform pedigree analysis</td>
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<td>25.</td>
<td>18BCU314A</td>
<td>Tools and Techniques in Biochemistry – Practical</td>
<td>1. Know the strength of laboratory acids and bases</td>
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<td>2. Prepare serial dilution of concentrated solutions</td>
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<td>3. Determine the molar extension coefficient</td>
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<td>4. Obtain UV spectrum for a given compound</td>
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<td>5. Quantify nucleic acids using spectrophotometer</td>
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<td>6. Assess the purity of nucleic acids</td>
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<td>2. Understand induction methods of polyploidy.</td>
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<td>3. Use buccal epithelial cells for genetic assessments.</td>
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<td>4. Understand monohybrid crosses.</td>
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<td>5. Calculate allele and genotype frequencies.</td>
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<td>6. Understand bacterial transformation.</td>
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<td>27.</td>
<td>18BCU401</td>
<td>Gene Organization, Replication and Repair</td>
<td>1. Understand the genome organization</td>
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<td>2. Understand the mechanism of replication DNA in prokaryotes</td>
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<td>3. Understand the mechanism of replication DNA in eukaryotes</td>
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<td>4. Understand the mechanism of transcription in both prokaryotes and eukaryotes</td>
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<td>5. Understand the basis of recombination and transposition of DNA</td>
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<td>6. Understand DNA damage, mutation and DNA repair process</td>
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<td>28.</td>
<td>18BCU402</td>
<td>Gene Expression and Regulation</td>
<td>1. Understand the mechanism of action of drugs</td>
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<td>2. Understand the stages of RNA biosynthesis</td>
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<td>3. Understand the mechanism of action of broad spectrum and specific antibiotics</td>
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<td>4. Utilize the specialized system for protein degradation</td>
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<td>5. Gain knowledge on RNA interference in the treatment of HIV and Cancer</td>
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<td>6. Gain knowledge on DNA repair mechanisms.</td>
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<td>29.</td>
<td>18BCU403</td>
<td>Chemistry-II</td>
<td>1. The metallurgy of metals and the theories of coordination compounds and</td>
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<td>2. The industrial importance of EDTA, hemoglobin and chlorophyll.</td>
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<td>3. The concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.</td>
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<td>4. The preparation, classifications and properties of amino acids, proteins and carbohydrates.</td>
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<td>5. The concepts of first and second laws of thermodynamics.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Lab Practical Activities</td>
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</tbody>
</table>
| 18BCU411    | Gene Organisation, Replication and Repair- Practical | 1. Isolate prokaryotic chromosomal DNA  
2. Isolate eukaryotic chromosomal DNA  
3. Determine the melting temperature for the given nucleotide sequence  
4. Know the concepts of hyper and hypo chromicity  
5. Determine the viscosity of DNA  
6. Verify Chargaff’s rule (purine=pyrimidine) |
| 18BCU412    | Gene Expression and Regulation- Practical | 1. Estimate total nucleic acids from plant tissue  
2. Estimate total nucleic acids from animal tissue  
3. Isolate mRNA using affinity chromatography  
4. Synthesize cDNA  
5. Perform RT-PCR  
6. Test Lac Operon in E. coli cells |
| 18BCU413    | Chemistry Practical - II | 1. Estimate sodium carbonate and sodium hydroxide using standards  
2. Estimate sulphuric acid using standard oxalic acid  
3. Estimate potassium permanganate by alkalimetry method  
4. Estimate ferrous sulphate using stand Mohr’s salt  
5. Estimate oxalic acid using standard ferrous sulphate  
6. Estimate calcium using direct method |
| 18BCU404A   | Bioinformatics | 1. Understand the basics of computer aided drug design  
2. Perform experiment pair wise and multiple sequence alignment and will analyze the secondary and tertiary structures of protein sequences  
3. Understand the data structure (databases) used in bioinformatics and interpret the information  
4. Perform search on protein and metabolic pathway databases  
5. Perform BLAST to identify the sequence of amino acids.  
6. Construct a phylogenetic tree using bioinformatics |
| 18BCU404B   | Protein Purification Techniques | 1. Understand the basic principles pertaining to protein purification  
2. Perform gel exclusion, affinity and ion exchange chromatography for protein purification  
3. Perform SDS PAGE and identify the molecular weight of the protein  
4. Understand the principle, instrumentation and applications of HPLC  
5. Perform dialysis technique  
6. Identify and apply appropriate techniques for purification of the given protein sample |
| 18BCU414A   | Bioinformatics – Practical | 1. Be able to retrieve a sequence from NCBI database  
2. Be able to search a protein from PDB  
3. Understand the different molecular file formats for saving a protein/DNA sequence  
4. Apply different sequence alignment databases such as BLAST and CLUSTALW.  
5. Apply the statistical approaches and models for phylogenetic analysis and tree reconstruction.  
6. Analyze and predict the protein structure using structure prediction databases |
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<th>Code</th>
<th>Course Title</th>
<th>Topics</th>
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</table>
| 36.    | 18BCU414B Protein Purification Techniques – Practical | 1. Gain knowledge on the basic principles pertaining to protein purification  
2. Perform gel exclusion, affinity and ion exchange chromatography for protein purification  
3. Perform SDS PAGE and identify the molecular weight of the protein  
4. Understand the principle, instrumentation and applications of HPLC  
5. Perform dialysis techniques for protein separation  
6. Identify and apply appropriate techniques for purification of the given protein sample |
| 37.    | 17BCU501A Clinical Biochemistry                  | 1. Know about organization of clinical laboratory  
2. Specimen collection  
3. Precision, accuracy calculations  
4. Quality control  
5. Automated systems  
6. Know to use the diagnosis to assess organ functioning |
| 38.    | 17BCU501B Biochemical Correlation of Diseases     | 1. Inborn errors of metabolism  
2. Nutritional disorders  
3. Life style disorders  
4. Autoimmune diseases  
5. Contagious diseases  
6. Vaccine strategies |
| 39.    | 17BCU502A Basic Microbiology                     | 1. Origin of microbiology field and theories  
2. Diverse nature of microbial organisms  
3. Life cycle of viruses  
4. Life cycle of bacteria  
5. Life cycle of algae, fungi and protozoa  
6. Emerging microbial threats |
| 40.    | 17BCU502B Nutritional Biochemistry                | 1. Concepts of nutrition  
2. Calorific value of carbohydrates, fats and proteins  
3. Recommended dietary allowances  
4. Nutrition as a strategy to prevent diseases  
5. Nutrition deficiency disorders  
6. Food drug interactions |
| 41.    | 17BCU503A Plant Biochemistry                     | 1. Concepts of nutrition  
2. Calorific value of carbohydrates, fats and proteins  
3. Recommended dietary allowances  
4. Nutrition as a strategy to prevent diseases  
5. Nutrition deficiency disorders  
6. Food drug interactions |
| 42.    | 17BCU503B Molecular Basis of Infectious Disease  | 1. Concept of infection  
2. Variety of infectious pathogens  
3. The process of infection by pathogenic bacteria  
4. The process of infection by pathogenic viruses  
5. The process of infection by pathogenic parasites  
6. How to prevent/treat infections |
| 43.    | 17BCU504 Chemistry-I                             | 1. Understand the molecular orbital theory, preparation and properties of inorganic compounds  
2. Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds  
3. Have knowledge about important industrial chemicals like silicones, fuel gases  
4. Know the classes of fertilizers and their impact on environment |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
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</table>
| 17BCU511A  | Clinical Biochemistry-Practical          | 5. Understand the elements of photochemistry, chemical kinetics and chromatography.  
6. Understand about the dyes, chemotherapy and vitamins |
| 17BCU511B  | Biochemical Correlation of Diseases-Practical | 1. How to collect and process serum/plasma samples?  
2. How to collect and process urine samples?  
3. Assessment of liver function  
4. Assessment of renal function  
5. Assessment of cardiac function  
6. Principles behind Dipstick method for fast diagnosis |
| 17BCU512A  | Basic Microbiology-Practical             | 1. Sterilization methods  
2. Autoclave, filtration techniques  
3. Preparation of microbial culture media  
4. Assessment of bacterial strains  
5. Pure cultures using streaking methods  
6. Colony counting |
| 17BCU512B  | Nutritional Biochemistry-Practical       | 1. Estimation of vitamin  
2. Homocysteine measurements  
3. Assessment of protein energy malnutrition  
4. Obesity assessments  
5. Oxidative stress measurements  
6. BMD assessments |
| 17BCU513A  | Plant Biochemistry—Practical             | 1. Preparation of plant tissue lysates  
2. Estimation of enzymes during germination  
3. Extraction of enzymes from plant source  
4. Separation of plant metabolites using TLC  
5. PTC media preparation, culturing techniques  
6. Vitamin assessments |
| 17BCU513B  | Molecular Basis of Infectious disease-Practical | 1. Preparation of slides for infectious pathogens  
2. the principle behind WIDAL test  
3. the basis of Gram staining  
4. the detection of pathogens using PCR  
5. Dot Blot principles  
6. differential diagnosis |
| 17BCU514   | Chemistry Practical- I                   | 1. Perform preliminary tests for identification of an organic compound  
2. Perform and detect the elements present in the given compound  
3. Identify and differentiate between aromatic and aliphatic compound  
4. Identify different functional groups and its nature  
5. Perform confirmatory test for aldehydes, ketones, amines and amides  
6. Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds |
| 17BCU601A  | Genetic Engineering and Biotechnology    | 1. The principles behind recombinant DNA technology  
2. Various tools required for recombinant DNA technology  
3. Cloning and expression vectors  
4. Production of industrial relevant proteins |
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<th>Course Code</th>
<th>Course Title</th>
<th>Natural Text</th>
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</table>
| 52. 17BCU601B | Research Methodology | 5. Production of drugs for clinical applications like insulin  
6. Application of rDNA technology in crop improvement |
| 53. 17BCU602A | Drug Biochemistry | 1. Literature search tools such as PubMed, Scopus, Google scholar  
2. Usage of research tools (Data export, management of citation styles)  
3. Processing of data and statistical analysis  
4. Template for research draft preparation (Structure of an article)  
5. Communication of research outputs (Usage of MS-PPT and verbal skills)  
6. Fundamentals of plagiarism and IPR |
| 54. 17BCU602B | Biostatistics | 1. Definition and classification of drugs  
2. Basics of Pharmacokinetics of a drug  
3. Basics of Pharmacodynamics in living system  
4. Mechanism of action of drugs  
5. Toxicity assessment  
6. Drug abuse |
| 55. 17BCU603 | Chemistry - II | 1. Use appropriate representation styles to present the data  
2. Perform correlation analysis  
3. Perform regression analysis  
4. Calculate mean, median, mode and standard deviation.  
5. Calculate the relationship between two variables.  
6. Test the significance of a particular data by various parameters |
| 56. 17BCU611A | Genetic Engineering and Biotechnology – Practical | 1. Know the precautions of handling Escherichia coli  
2. Isolate the plasmid DNA from Escherichia coli  
3. Restriction digestion using enzymes such as ECoRI, Hind III  
4. Amplify the rDNA using PCR  
5. Understand the techniques related to transformation of plasmid into E. coli  
6. Understand the steps involved in Western blot analysis |
| 57. 17BCU611B | Research Methodology – Practical | 1. Perform Literature survey related to life sciences/medical research  
2. Export the data to appropriate format  
3. Collate the data  
4. Identify the gap in the literature  
5. Inculcate originality in writing  
6. Understand IPR concepts |
<p>| 58. 17BCU612A | Drug Biochemistry – Practical | 1. Handle small experimental animals such as rats, mice and rabbits |</p>
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|   | 2. Learn Enteral and parenteral route of drug administration  
3. Learn to assess behavioral changes  
4. Learn to assess drug toxicity  
5. Learn the basis of LD50  
6. Monitor adverse effects of drugs |   |
| 59. | 17BCU612B | Biostatistics-Practical |
|   | 1. Measure mean, median and mode  
2. Perform Coefficient of variation  
3. Execute Correlation analysis  
4. Perform Regression analysis  
5. Perform RANK correlation test  
6. Analysis the difference between means using T-test |   |
| 60. | 17BCU613 | Chemistry Practical - II |
|   | 1. Estimate sodium carbonate and sodium hydroxide using standards  
2. Estimate sulphuric acid using standard oxalic acid  
3. Estimate potassium permanganate by alkalimetry method  
4. Estimate ferrous sulphate using stand Mohr’s salt  
5. Estimate oxalic acid using standard ferrous sulphate  
6. Estimate calcium using direct method |   |
Name of the Department: **Biochemistry**  
**Course:** M.Sc. Biochemistry

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</table>
| 1.      | 19BCP101    | Chemistry of Biopolymers                    | 1. Understand the structure and organization of storage and structural polysaccharides in living system  
2. Recognize the structure and importance of proteins and amino acids in biological system.  
3. Recall the role of lipids in bio membrane including signal transduction  
4. Equip with the knowledge on antioxidants and their importance  
5. Differentiate the structure, types, properties and functions of DNA and RNA  
6. Recognize the nucleic acid interaction with proteins and gain knowledge in molecular techniques                                                                                                                   |
| 2.      | 19BCP102    | Enzymes and Microbial Technology            | 1. Understand the mechanism of action of enzymes and their classifications.  
2. Recall the kinetics of enzyme catalyzed reactions  
3. Understand the enzyme immobilization concept and apply the knowledge to produce more products out of it.  
4. Gain knowledge in designing fermenter based on Industrial needs  
5. Have clear understanding of microbe’s implication to derive a product and the role of enzymes in downstream process.  
6. Clear in concept of various culture techniques and apply the suitable one for a particular application.                                                                                                                                       |
| 3.      | 19BCP103    | Bioinstrumentation and Good Laboratory Practices | 1. Apply the centrifugation techniques in biological system  
2. Use colorimetry and spectrophotometry for sample analysis  
3. Use chromatographic techniques for sample analysis  
4. Calibrate analytical instruments  
5. Detect radioisotopes and analyze samples using electrophoretic techniques  
6. Follow the good laboratory practices procedures                                                                                                                   |
| 4.      | 19BCP104    | Cellular Biochemistry                        | 1. Recognize the organization and dynamics of mitochondria.  
2. Recognize cell interaction and their mechanism.  
3. Maintain cytoskeleton structure and functions of micro, macro and intermediary filaments.  
4. Recognize the cell signaling mechanisms and pathways.  
5. Enumerate the phases of cell cycle, events in cell division and mechanism of cell death  
6. Relate properties of cancerous cells to mutational changes in gene function.                                                                                                                                             |
<p>| 5.      | 19BCP105A   | Plant Biochemistry                           | 1. Recall the understanding of plant cell organelles and their functions                                                                                              |</p>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 6. 19BCP105B | Ecology and Evolutionary biology                 | 1. Appreciate the diversity of life  
2. Interact with each other and their environment  
3. Have practical understanding of species interaction  
4. Built a structured community  
5. Expertise in behavioral ecology  
6. Recognize the central role of ecology and evolution in biology |
| 7. 19BCP105C | Biopharmaceutics                                  | 1. Explain biopharmaceutical, physiological, biochemical and cell biology-related aspects  
2. Understand the transport and metabolism of drugs in the gastrointestinal tract and in the liver.  
3. Explain mechanisms behind the transport of drug and metabolism and how drugs can interact with other drugs and food and methods to study these  
4. Have developed its ability to plan, compile, analyze and report experiment that has importance for biopharmaceutical issues  
5. Recognize the regulatory requirements within the biopharmaceutical area  
6. Describe the role of biopharmaceutics in drug development within the pharmaceutical industry |
| 8. 19BCP111 | Practical – I Quantitative Estimation and Separation Techniques | 1. Prepare buffers and reagents based on the needs of experiments  
2. Estimate macromolecules quantitatively thro colorimetric procedures  
3. Estimate vitamins and calcium using fluorimetry and titrimetry  
4. Quantify secondary metabolites using HPLC  
5. Separate the macro molecules using TLC and column chromatography  
6. Extract and purify protein from various sources |
| 9. 19BCP112 | Practical – II Plant Biochemistry and Microbiology | 1. Phytochemical screening and secondary metabolite estimation  
2. Microbiological techniques  
3. Microbial identification in soil and water samples  
4. Isolation, characterization and purification of microbial enzymes.  
5. Antibacterial activity of active compounds  
6. Callus induction and regeneration of plantlets |
| 10. 19BCP201 | Regulation of Metabolic Pathways                 | 1. Gain knowledge on glucose anabolic and catabolic pathways that ultimately control the glucose homeostasis.  
2. know the metabolic pathway of amino acid and their regulation with associated disorders.  
3. learn fatty acid synthesis and degradation and their regulation |
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<td>4.</td>
<td>Able to explain the role of lipids, their metabolism and their stringent control by hormones and other factors.</td>
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<td>5.</td>
<td>Understand the anabolic and catabolic processes associated with amino acids and nucleic acids and their regulation.</td>
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<td>6.</td>
<td>Able to understand the energy homeostasis during starvation and energy excess</td>
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**11. 19BCP202  Molecular Biology**

1. Acquire the knowledge on molecular structure of genes.
2. Understand the structure of nucleic acids and the DNA replication process
3. Learn about the process of transcription
4. Understand the mechanism of translation
5. Learn about gene regulation in prokaryotes
6. Learn about gene regulation in eukaryotes

**12. 19BCP203  Developmental Genetics**

1. Comprehensive, detailed understanding of the chemical basis of heredity
2. Comprehensive and detailed understanding of genetic methodology
3. Quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.
4. Comprehensive detailed understanding of cellular mechanisms of developmental stages.
5. Ramifications of inherence, gene structure and function, gene mutation, and research related to genetics and its applications.
6. Knowledge on chemical changes in cell division and cleavage

**13. 19BCP204  Bioinformatics**

1. Acquire the knowledge on biological data, submission and retrieval from databases.
2. Able to make experiment pair wise and multiple sequence alignment
3. Analyze the secondary and tertiary structures of protein sequences.
4. Understand the data structure (databases) used in bioinformatics and interpret the information (especially: find genes; determine their functions),
5. Understand and be aware of current research and problems relating to this area.
6. Knowledge on applications of bioinformatics

**14. 19BCP205A  Recombinant DNA Technology**

1. Understand the application of genetic engineering techniques in basic and applied experimental biology
2. Learn the concept of recombinant DNA technology or genetic engineering
3. Understand the expression of gene cloning vectors
4. Explore the knowledge on genomic library
5. Proficiency in designing and conducting experiments involving genetic manipulation.
6. Describe DNA fingerprinting, and restriction fragment length polymorphism (RFLP) analysis and their applications.

**15. 19BCP205B  Animal Tissue Culture**

1. Demonstrate foundational knowledge of Cell culture techniques and competence in laboratory techniques.
2. Set up a tissue culture lab to carry out research based on cell lines.
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<tr>
<td><strong>3. Extrapolate the different types of culture media</strong>&lt;br&gt;<strong>4. Understand the various types of cultures</strong>&lt;br&gt;<strong>5. Learn synchronization of cell cultures and cell division</strong>&lt;br&gt;<strong>6. Know the importance of stem cell research and its applications</strong></td>
<td><strong>16. 19BCP205C Genomics and Proteomics</strong>&lt;br&gt;1. Identify and describe the different components in prokaryotic and eukaryotic genomes and proteomes.&lt;br&gt;2. Identify molecular mechanisms responsible for diseases.&lt;br&gt;3. Use the different methodologies, techniques and tools commonly used in genome sequencing, assembly and annotation.&lt;br&gt;4. Use the different methodologies, techniques and tools commonly used in proteomics.&lt;br&gt;5. Address the modern biological issues.&lt;br&gt;6. Characterize the protein complexes</td>
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<td><strong>17. 19BCP211 Practical – III Molecular Biology and Animal Biotechnology</strong>&lt;br&gt;1. To demonstrate knowledge and understanding of the molecular machinery of living cells, cell and tissue culture to manipulate.&lt;br&gt;2. To explore the genomes of animals for ways to improve the livestock for food production and biomedical purpose as well as and to analyze, interpret, and participate in reporting to their peers on the results of their laboratory experiments.&lt;br&gt;3. Identification of DNA by Agarose gel electrophoresis&lt;br&gt;4. Estimation of RNA by Orcinol method&lt;br&gt;5. Preparation of competent E coli- transformation&lt;br&gt;6. Ligation of DNA</td>
<td><strong>18. 19BCP212 Practical – IV Biological Databases and Analysis</strong>&lt;br&gt;1. The course will enable students to use various biological databases&lt;br&gt;2. The importance functions in the biological system.&lt;br&gt;3. The use computational approaches for pair wise, multiple and phylogenetic analysis.&lt;br&gt;4. Aware to predict the physio-chemical properties, protein structure and validation using computer-based labs.&lt;br&gt;5. Solve the biological problems using various computational tools and techniques.&lt;br&gt;6. Visualization of Protein structure by RASMOL</td>
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<td><strong>21. 18BCP303 Endocrinology</strong>&lt;br&gt;1. Hypothalamo - Hypophyseal axis&lt;br&gt;2. Different classification of hormones&lt;br&gt;3. Functioning of peptide and steroid hormones</td>
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<td>Course Code</td>
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| 18BCP304    | Drug Biochemistry | 4. The molecular and cellular basis of endocrine pathologies  
5. Role of hormones in different stages of gestation  
6. The techniques involved in the assessment of endocrine functions |
| 18BCP305A   | Biostatistics and Research Methodology | 1. Use appropriate representation styles to present the data  
2. Perform correlation analysis  
3. Perform regression analysis  
4. Calculate mean, median, mode and standard deviation.  
5. Calculate the relationship between two variables.  
6. Test the significance of a particular data by various parameters. |
| 18BCP305B   | Clinical Research and IPR | 1. Steps involved in drug discovery  
2. Using small experimental animals  
3. Phase 2 and Phase 3 trials  
4. Questionnaire preparation  
5. Intellectual property rights  
6. Patents laws |
| 18BCP305C   | Dietetic Management of Disease | 1. Nutrition as a drug  
2. Dietary management of diabetes  
3. Dietary management of obesity  
4. Dietary management of cardiovascular diseases  
5. Nutrition deficiency affecting hematopoiesis and diet for individual with cancer  
6. Dietary management of musculoskeletal diseases |
| 18BCP311    | Practical – V Clinical Enzymes And Immunology | 1. Various methods of assaying clinically relevant enzymes  
2. The diagnostic significance of enzyme assays  
3. Working knowledge principle of Radial immunodiffusion  
4. Working knowledge principle of Double immunodiffusion  
5. Working knowledge principle of Immunoelectrophoresis  
6. Working knowledge principle of Glucose tolerance test |
| 18BCP312    | Practical – VI Clinical Biochemistry and Animal Studies | 1. Explain the physiopathological bases and the biochemical markers of the most prevalent diseases in our population  
2. Perform the estimation of biomolecules such as glucose and cholesterol  
3. Assess renal function through the analysis of urea and uric acid in serum  
4. Assess liver function through the estimation of bilirubin  
5. Determine A/G ratio and interpret its relevance  
6. Handle the small experimental animals  
7. Understand the differences and significance of routes of injections |
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<th>Sl. No</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</table>
| 1.    | 19LSU101    | Language -I                         | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment  
5. Communication skills will get developed.  
6. Develop to have language competence. |
| 2.    | 19ENU101    | English                             | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment  
5. Communication skills will get developed.  
6. Develop to have language competence. |
| 3.    | 19BTU101    | Biochemistry and Metabolism         | The learners will be able to,  
1. To acquire knowledge on the structure, functional relationship of proteins, nucleic acid, carbohydrates and their role in various biological processes.  
2. To know about the role of various enzymes in metabolic process.  
3. To quench the in-depth concepts of metabolism related disorders.  
4. To know how genes are transmitted between generations, and how and when errors can arise.  
5. To plan and safely perform fundamental techniques in molecular and cellular biology.  
6. To get awareness of the ethical aspects of molecular science |
| 4.    | 19BTU102    | Cell Biology                        | The learners will be able to,  
1. Understand the composition of prokaryotic and eukaryotic cells and its function.  
2. Acquire information about intracellular and extracellular organelles and their functions.  
3. Gain their knowledge to prevent cellular abnormalities and associated disorders.  
4. Test and deepen their mastery of genetics by applying |
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<td>5.</td>
<td>19BTU103</td>
<td>Chemistry -I</td>
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<td>The student understands</td>
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<td>1. The molecular orbital theory, preparation and properties of inorganic compounds.</td>
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<td>2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.</td>
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<td>3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.</td>
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<td>6.</td>
<td>19BTU111</td>
<td>Biochemistry and Metabolism Practical</td>
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<td>The learners will be able to,</td>
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<tr>
<td></td>
<td>1. Gain skills on quantitative estimation methods for various biomolecules from natural sources.</td>
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<td>2. Acquire handling skills to handle the spectroscopy instrumentations.</td>
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<td>3. Obtain skills on primary screening of biochemical markers in samples.</td>
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<td>4. Develop skills to prepare useful reagents in the laboratory.</td>
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<td>5. Use of handling of glass wares, minor equipment for conducting experiments.</td>
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<td>6. Learn safety and precautionary measures for working in a laboratory.</td>
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<td>7.</td>
<td>19BTU112</td>
<td>Cell Biology Practical</td>
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<td>The learners will be able to,</td>
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<td></td>
<td>1. Understand the unique features of plant and animal cells.</td>
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<td>2. Gain the practical skills on tissue mounting techniques to visualize the cell morphology.</td>
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<td>3. Acquire knowledge about cell’s response to various environmental conditions.</td>
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<td>4. Able to differentiate the cells of various living organisms and get awareness of physiological processes of cell.</td>
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<td>5. Able to observe and correctly identify different cell types, cellular structures using different microscopic techniques.</td>
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<td>6. Able to handle the equipment available and identify the suitable and appropriate experiments for their experiments.</td>
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<td>8.</td>
<td>19BTU113</td>
<td>Chemistry Practical - I</td>
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<td>1. The molecular orbital theory, preparation and properties of inorganic compounds.</td>
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<td>2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.</td>
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</table>
3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
4. Elements of photochemistry, chemical kinetics and chromatography.
5. About the dyes, chemotherapy and vitamins.

9. 19LSU201 Language - II

1. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
2. Elements of photochemistry, chemical kinetics and chromatography.
3. About the dyes, chemotherapy and vitamins.
4. Principles and applications of Column, Paper and Thin Layer Chromatography.

10. 19BTU201 Genetics

The learners will be able to,
1. Acquire knowledge about the central theories and methodologies traditional, molecular and population genetics.
2. Acquire information on sex-linked inheritance and associated diseases.
3. Understand the role of genetics in breeding and natural selection.
4. Apply the principles of inheritance as formulated by Mendel.
5. Apply the Hardy-Weinberg Law in analyzing population genetics for gene frequency, sex linkage, equilibrium, and heterozygote frequency.
6. Acquire knowledge about the relationship between genetic, physical, and cytogenetic maps.

11. 19BTU202 Chemistry - II

1. The students will be able to understand the metallurgy of metals
2. The students will be able to understand the theories of coordination compounds and the industrial importance of EDTA, haemoglobin and chlorophyll.
3. The students will be able to understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.
4. The students will be able to understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.
5. The students will be able to understand the concepts of first and second laws of thermodynamics.
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<tr>
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<th>Course Title</th>
<th>Description</th>
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<tr>
<td>12. 19BTU203</td>
<td>General Microbiology</td>
<td>On completion of the course, students are able to:</td>
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<tr>
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<td>1. Gain rigorous knowledge on historical perspective of Microbiology</td>
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<td>2. Acquire basic knowledge on different structure of microbes.</td>
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<td>3. Get Ideas on different type of microscope.</td>
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<td>4. Acquire basic knowledge the different applications of microbiology in biotechnology.</td>
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<td>5. Acquire basic knowledge of genetic, metabolic strategies and ecology of microorganisms.</td>
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<td>6. Acquire basic knowledge about microbial metabolism, growth, energy generation and disease caused.</td>
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<td>13. 19BTU211</td>
<td>Genetics Practical</td>
<td>The learners will be able to</td>
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<td></td>
<td>1. Gain rich knowledge on genetic model system used in research.</td>
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<td>2. Acquire basic knowledge on different stages in cell division.</td>
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<td>4. Acquire basic knowledge on karyotyping</td>
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<td>5. Acquire basic knowledge of genetic variations among microorganisms.</td>
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<td>6. Apply the principles of inheritance as formulated by Mendel.</td>
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<td>14. 19BTU212</td>
<td>Chemistry Practical - II</td>
<td>1. Student will be able to learn the principles of quantitative analysis of inorganic compounds.</td>
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<td>2. Student will be able to learn the estimation of sample present in a solution by volumetric analysis</td>
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<td>3. Understand the concepts of quantitative analysis</td>
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<td>4. Recognize the indicators, acid and bases used in volumetric analysis</td>
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<td>5. Estimate the amount of substance present in a given solution</td>
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<td>6. Utilize the mathematical skills doing calculations</td>
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<td>15. 19BTU213</td>
<td>General Microbiology Practical</td>
<td>On completion of the course, students are able to</td>
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<td></td>
<td>1. Develop basic skill in aseptic techniques</td>
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<td></td>
<td>2. Have outline knowledge on isolation, sub culture and maintenance of microbes.</td>
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<td>3. Gain experience in microbiological laboratory practices and skills in the design and execution of microbiology related research.</td>
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<td>4. Develop skills to prepare useful medias for microbial growth in the laboratory.</td>
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<td>5. Use of handling of glass wares, minor equipment for conducting experiments.</td>
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<td>6. Learn safety and precautionary measures for working with microbes in a laboratory.</td>
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<td>16. 19AEC201</td>
<td>Environmental Studies</td>
<td>The learners will be able to,</td>
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<td></td>
<td>1. Understand the concepts and methods from ecological and physical sciences and their application in environmental problem solving.</td>
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<td>2. Study the concepts and methods from economic, political, and social analysis as they pertain to the design.</td>
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</table>
1. Gain adequate knowledge on plant biodiversity and importance.
2. Understand the molecular mechanisms of macro and micro nutrients in plant growth.
3. Get the basic and applied knowledge of plant physiology, growth, development and metabolism.
4. Impart an insight into the various plant water relations
5. Understand the mechanism of various metabolic processes in plants
6. Equip students with skills and techniques related to plant physiology so that they can design their own experiments

18. **18BTU302 Molecular Biology**

The learners will be able to,
1. Achieve knowledge about the functions of nucleic acids and proteins.
2. Acquire an in-depth knowledge of chemical and molecular processes that occur in and between the cells.
3. Gain an insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.
4. Acquire knowledge about the mechanisms behind gene regulations.
5. Gain knowledge about mechanism behind translation and transcription
6. Acquire an in-depth knowledge about mutation and its significance

19. **18BTU303 Immunology**

The learners will be able to,
1. Gain about the various cells and organs involved in the immune system.
2. Understand the molecular mechanisms of antigen-antibody interactions and also the molecular mechanisms behind the immune response evoked after infection by various pathogens.
3. Learn the theoretical basis for the various immunological techniques.
4. Describe which cell types and organs present in the immune response
5. Apply basic techniques for identifying antigen antibody interactions.
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<td><strong>20.</strong></td>
<td><strong>18BTU304A</strong></td>
<td>I.P.R., Entrepreneurship, Bioethics and Biosafety</td>
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<td></td>
<td>On completion of the course, students are able to</td>
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<td></td>
<td>1. Acquire the knowledge on filling and submission of copy rights and related property rights.</td>
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<td>2. Gain knowledge in developing new pilot scale/large scale industries and associated formalities</td>
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<td>3. Understand the importance of patenting/copyrights/Trade marks</td>
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<td>4. Acquire the knowledge on fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.</td>
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<td>5. Disseminate knowledge on patents, patent regime in India and abroad and registration aspects</td>
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<td>6. Disseminate knowledge on copyrights and its related rights and registration aspects</td>
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<td><strong>21.</strong></td>
<td><strong>18BTU304B</strong></td>
<td>Bio - Analytical Tool</td>
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<td>On completion of the course, students are able to</td>
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<td></td>
<td>1. Know the working principle, maintenance, and calibrations of bioanalytical tools and technique</td>
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<td>2. Estimate the number of biomolecules using the Bioanalytical tool</td>
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<td>3. Implement the bioanalytical techniques to analyze the biomolecules</td>
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<td>4. Use selected analytical techniques.</td>
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<td>5. Be familiar with working principals, tools and techniques of analytical techniques.</td>
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<td>6. To understand the strengths, limitations and creative use of techniques for problem-solving.</td>
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<td><strong>22.</strong></td>
<td><strong>18BTU311</strong></td>
<td>Plant Physiology Practical</td>
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<td>The learners will be able to</td>
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<td></td>
<td>1. Study and impart knowledge about the occurrence, distribution, structure and life history of plants.</td>
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<td></td>
<td>2. Enable the students to learn in detail about mono and dicot plant activity.</td>
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<td>3. Learn the phylogeny concepts in plants.</td>
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<td>4. Understand water relation of plants with respect to various physiological processes.</td>
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<td>5. Explain root nodules from a leguminous plant</td>
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<td>6. Classify stress indicators</td>
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<td><strong>23.</strong></td>
<td><strong>18BTU312</strong></td>
<td>Molecular Biology Practical</td>
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<td>The learners will be able to</td>
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<td></td>
<td>1. Perform the experiments for isolation, purification and visualize the nucleic acid from various sources</td>
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<td>2. Acquire skills on plasmid DNA extraction.</td>
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<td>3. Gain basic knowledge on DNA extraction and separation by electrophoresis.</td>
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<td>4. Know the protocol for detection of mutation in microbes.</td>
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<td>5. Understand what genes are and how they are inherited</td>
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<td>6. Know how they control cellular activity and they respond to environment.</td>
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<td><strong>24.</strong></td>
<td><strong>18BTU313</strong></td>
<td>Immunology Practical</td>
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<td>The learners will be able to,</td>
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<td></td>
<td>1. Gain about the various cells and organs involved in the immune system.</td>
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<td>2. Understand the molecular mechanisms of antigen-antibody interactions and also the molecular</td>
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<td>3.</td>
<td>Learn the theoretical basis for the various immunological techniques.</td>
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<td>4.</td>
<td>Transfer knowledge of immunology into clinical decision-making through case studies presented in class.</td>
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<td>5.</td>
<td>Demonstrate a capacity for problem-solving about immune responsiveness.</td>
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<td>6.</td>
<td>Describe the roles of the immune system in both maintaining health and contributing to disease.</td>
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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>25. 18BTU314A</td>
<td>I.P.R., Entrepreneurship, Bioethics and Biosafety Practical</td>
<td>On completion of the course, students are able to: 1. Acquire the knowledge on filling and submission of copy rights and related property rights. 2. Gain knowledge in developing new pilot scale / large scale industries and associated formalities. 3. Understand the importance of patenting/copyrights/Trade marks. 4. Acquire the knowledge on fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries. 5. Disseminate knowledge on patents, patent regime in India and abroad and registration aspects. 6. Disseminate knowledge on copyrights and its related rights and registration aspects.</td>
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<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>26. 18BTU314B</td>
<td>Bio - Analytical Tool Practical</td>
<td>On completion of the course, students are able to: 1. Know the working principle, maintenance, and calibrations of bioanalytical tools and techniques. 2. Estimate the number of biomolecules using the Bioanalytical tool. 3. Implement the bioanalytical techniques to analyze the biomolecules. 4. Use selected analytical techniques. 5. Be familiar with working principals, tools and techniques of analytical techniques. 6. To understand the strengths, limitations and creative use of techniques for problem-solving.</td>
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<th>Course Code</th>
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<tr>
<td>27. 18BTU401</td>
<td>Bioprocess Technology</td>
<td>The learners will be able to: 1. Gain overall knowledge of industrial biotechnology. 2. Obtain information about the application of industrially important microbes. 3. Know the screening, extraction and purification of enzymes. 4. Designing of bioreactors and control necessary for maximizing production. 5. Select and optimize media for maximum production of microbial metabolites. 6. Designing of protocols for strain improvement and separation of molecules after fermentation process.</td>
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<th>Course Code</th>
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<tbody>
<tr>
<td>28. 18BTU402</td>
<td>Recombinant DNA Technology</td>
<td>On completion of the course, students are able to: 1. Outline the fundamental steps in a genetic engineering procedure.</td>
</tr>
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</table>
2. Describe the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production.
3. Explain the usefulness of plasmid preparations, how they are performed, and how the concentration and purity of plasmid samples can be determined.
4. Discuss cloning strategies and techniques used to probe DNA for specific genes of interest.
5. Conceptualize PCR technique in medical and forensic science.
6. Summarize various applications of rDNA technology in human health care and safety regulations.

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<th>29. 18BTU403 Genomics and Proteomics</th>
<th>On completion of the course, students are able to</th>
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<tr>
<td>1. Have a clear understanding on the application of genetic markers in genome mapping.</td>
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<td>2. Application of 2D technique to analyze the structure of protein.</td>
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<td>3. Analyze the genomic and proteomic data.</td>
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<td>4. Acquire knowledge and understanding of fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology.</td>
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<td>5. Discuss how biological systems information relating to genes, proteins and cellular structures can be used to model living cells, and even to create new synthetic cells</td>
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<td>6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.</td>
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<th>30. 18BTU404A Industrial Fermentation</th>
<th>On completion of the course, students are able to</th>
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<tr>
<td>1. Have a clear understanding on the application of growth kinetics.</td>
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<td>2. Design a fermenter and parameters to be monitored and controlled in fermentation process.</td>
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<td>3. Gain knowledge about the principle of sterilization necessary for fermentation.</td>
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<td>4. Acquire knowledge about the cell growth and product formation.</td>
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<td>5. Evaluate the kinetics and mechanism of microbial growth.</td>
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<td>6. Develop protocol for scale-up and harvesting from shake flask to bench top fermenter.</td>
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<th>31. 18BTU404B Enzymology</th>
<th>On completion of the course, students are able to</th>
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<tr>
<td>1. Understand the chemical principles of enzyme catalysis, including cofactor chemistry</td>
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<td>2. Show insight in the action of enzymes as biocatalysts and in factors that influence enzyme activity</td>
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<td>3. Understand the kinetics of enzymatic reactions</td>
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<td>4. Show awareness of the influence of enzyme structure on catalytic properties</td>
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<td>5. Show experience with purification, handling and characterization of proteins</td>
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<td>6. Show insight in the physico-chemical properties of proteins that underlie purification methods</td>
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<tr>
<td>32. 18BTU411</td>
<td>Bioprocess Technology Practical</td>
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<td>33. 18BTU412</td>
<td>Recombinant DNA Technology Practical</td>
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<td>34. 18BTU413</td>
<td>Genomics and Proteomics Practical</td>
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<td>35. 18BTU414A</td>
<td>Industrial Fermentation Practical</td>
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| 44  | 17BTU504B  | Animal diversity-I              | The learners will be able to  
1. Outline the origin and classification of animal kingdom  
2. Describe the origin of animals and how they differ from other living organisms;  
3. Explain the relationship between animal diversity and evolutionary derived changes in animal body plans  
4. Analyze the various modes of adaptations in animals  
5. Identify and classify with examples the invertebrates  
6. Analyze the various modes of adaptations in animal. |
| 45  | 17BTU511A  | Plant Diversity I               | The learners will be able to,  
1. Gain adequate knowledge on plant biodiversity and importance.  
2. Understand the molecular mechanisms of macro and micro nutrients in plant growth.  
3. Get the basic and applied knowledge of plant physiology, growth, development and metabolism.  
4. Discuss about importance of morphological structure, classification, reproduction and economic importance of Algae.  
5. Know the control measures of plant diseases.  
6. Explain about structure, classification, reproduction, life cycle and economic importance of Bryophytes. |
| 46  | 17BTU511B  | Basics of Forensic Science      | On completion of the course, students are able to  
1. Apply the Laboratory skills to participate in the career needs of Forensic community.  
2. Become trained in the laboratory skills of different division of Forensic Science.  
3. Be able to work with different R&D organizations.  
4. Identify the role of the forensic scientist and physical evidence within the criminal justice system.  
5. Demonstrate the ability to document and orally describe crime scenes, physical evidence, and scientific processes.  
6. Identify and examine current and emerging concepts and practices within the forensic science field. |
| 47  | 17BTU512A  | Bioinformatics                  | On completion of the course, students are able to  
2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences.  
3. Inculcate knowledge on building 3D structures of genes.  
4. Locate and use the main databases at the NCBI and EBI resources  
5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information.  
6. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences. |
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<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Practical/Practical Theory</th>
<th>The learners will be able to</th>
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</table>
| 48.  | 17BTU512B       | Plant Diversity – II Practical           | Practical                   | 1. Study and impart practical knowledge about the occurrence, distribution, structure and life history of plants  
2. Learn in detail about vegetative and reproductive parts of plants.  
3. Learn the phylogeny and evolutionary concepts in plants.  
4. Learn how to handle a fossilized specimen  
5. Acquire knowledge about the structure, life history and Economic importance of Gymnosperms  
6. Learn the skills on morphological identification of plants |
| 49.  | 17BTU513A       | Plant Biotechnology Practical            | Practical                   | 1. Study and impart knowledge about the occurrence, distribution, of plants and suitable explants.  
2. Learn in detail about growth hormones.  
3. Learn the sterilize and prepare an explant of plants.  
4. Learn how to handle a PTC equipment  
5. Acquire knowledge about aseptic condition maintained in lab  
6. Learn the skills on plant culture techniques |
| 50.  | 17BTU513B       | Evolutionary Biology Practical           | Practical                   | On completion of the course, students are able to  
1. Get hold of the practical knowledge on fundamentals of Evolutionary Biology.  
2. Expertise on the Sampling techniques.  
3. Acknowledge on the Qualitative Studies Based on Field Observations  
4. To develop comprehensive knowledge regarding various Sources of Variations and their role in evolution.  
5. To explore salient features of various theories of evolution comprising of Lamarckism, Darwinism and Neo-Darwinism.  
6. To impart detailed understanding of Analogy, Homology, Paleontological Evidences, Embryological Evidences and Molecular Phylogeny. |
| 51.  | 17BTU514A       | Animal Biotechnology Practical           | Practical                   | On completion of the course, students are able to  
1. Understand the growth conditions required to culture the animals in invitro conditions.  
2. Inculcate the deep understanding of Laboratory sterilization  
3. Acquire knowledge on DNA isolation from animal tissue  
4. Understand the Minimal Essential Growth medium  
5. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of animal biotechnology experiments  
6. Learn the structure and organization of animal genome |
| 52.  | 17BTU514B       | Animal Diversity-I Practical             | Practical                   | The learners will be able to  
1. Outline the origin and classification of animal kingdom  
2. Describe the origin of animals and how they differ from other living organisms;  
3. Explain the relationship between animal diversity and evolutionary derived changes in animal body plans |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>17BTU601A</td>
<td>Molecular Diagnostics</td>
<td>On completion of the course, students are able to</td>
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<tr>
<td></td>
<td></td>
<td>1. Get hold of the knowledge on fundamentals of molecular diagnostic techniques.</td>
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<td></td>
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<td>2. Expertise on the concepts of infection, diagnosis and control assortment.</td>
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<td>3. Acknowledge on the qualitative studies based on biomarker observations.</td>
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<td></td>
<td>4. Apply methodologies of laboratory diagnostics to relevant states of health.</td>
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<td>5. Be aware of characteristics signs of clinical manifestations.</td>
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<td>6. Comprehend and analyse the concept of disease management.</td>
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<tr>
<td>17BTU601B</td>
<td>Biotechnology and Human Welfare</td>
<td>On completion of the course, students are able to</td>
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<td></td>
<td>1. Apply the biotechnology concept for environmental and social welfare.</td>
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<td>2. Expertise on the concepts of treatment strategies for waste to renewable energy.</td>
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<td>3. Able to produce by-products from waste with help of biotechnology techniques.</td>
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<td>4. Able to apply DNA based methods used in forensic science laboratory</td>
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<td>5. Able to entry into a wide range of biotechnology industries and research enterprises.</td>
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<td>6. Development of non-toxic therapeutic agents, recombinant live and DNA vaccines and gene therapy</td>
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<tr>
<td>17BTU602A</td>
<td>Medical Microbiology</td>
<td>On completion of the course, students are able to</td>
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<td></td>
<td>1. Apply the biotechnology concept for controlling infectious agents.</td>
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<td>2. Expertise on the concepts of metabolism, regulation and replication of pathogenic microbes.</td>
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<td>3. Able to get knowledge on the toxins released by microbes.</td>
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<td>4. Able to enter into a wide range of biotechnology industries with research enterprises.</td>
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<td>5. Develop of non-toxic therapeutic agents from microbes</td>
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<td>6. Able to get knowledge on Fungal and Protozoan infections</td>
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<tr>
<td>17BTU602B</td>
<td>Environmental Biotechnology</td>
<td>On completion of the course, students are able to</td>
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<td>1. Bio-management of soil</td>
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<td>2. Bio-management of Petroleum Contaminants</td>
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<td>3. Environmental significance of genetically modified microbes, plants and animals</td>
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<td>4. Biosurfactants</td>
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<td>5. Treatment of municipal waste and Industrial effluents</td>
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<td>6. Genetic engineering of bacteria and their potential for bioremediation</td>
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<tr>
<td>17BTU603A</td>
<td>Biostatistics</td>
<td>On completion of the course, students are able to</td>
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<td></td>
<td>1. Apply the statistical tool knowledge for research data analysis.</td>
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<td>Course Code</td>
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<tr>
<td>59. 17BTU611A</td>
<td>Molecular Diagnostics Practical</td>
<td>On completion of the course, students are able to 1. Get hold of the knowledge on fundamentals of molecular diagnostic techniques. 2. Expertise on the concepts of infection, diagnosis and control assortment. 3. Acknowledge on the qualitative studies based on biomarker observations. 4. Apply methodologies of laboratory diagnostics to relevant states of health. 5. Be aware of characteristics signs of clinical manifestations. 6. Comprehend and analyses the concept of disease management</td>
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<tr>
<td>60. 17BTU611B</td>
<td>Biotechnology and Human Welfare Practical</td>
<td>On completion of the course, students are able to 1. Apply the biotechnology concept for industry products. 2. Expertise on the concepts of treatment strategy. 3. Able to understand the plant part infected with a microbe. 4. Able to enter into a wide range of research enterprises. 5. Get expertise in Bioethics. 6. Understand the concepts of complement course “Biotechnology in Human Welfare.”</td>
</tr>
<tr>
<td>61. 17BTU612A</td>
<td>Medical Microbiology Practical</td>
<td>On completion of the course, students are able to 1. Get hold of the knowledge on fundamentals of diagnostic techniques. 2. Expertise on the concepts of infection, diagnosis and control assortment. 3. Acknowledge on the qualitative studies based on biomarker observations. 4. Apply methodologies of laboratory diagnostics to relevant states of health. 5. Be aware of characteristics signs of clinical manifestations.</td>
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<td>62. 17BTU612B</td>
<td>Environmental Biotechnology Practical</td>
<td>On completion of the course, students are able to apply their knowledge on: 1. Environmental problems 2. Wastewater treatment 3. BOD and its calculation 4. COD and its calculation 5. Bacterial Examination of Water 6. Biofertilizers</td>
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<tr>
<td>63. 17BTU613A</td>
<td>Biostatistics Practical</td>
<td>On completion of the course, students are able to: 1. Apply the statistical tool knowledge for research data analysis. 2. Understand the concept of various hypothesis regarding data analysis. 3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.) 4. To perform analysis to determine the mean, median, mode and standard deviation of given sample/data 5. To perform analysis, determine the probability of given sample/data 6. To perform the t-test/F-Test and Chi-square test of given data</td>
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<tr>
<td>64. 17BTU613B</td>
<td>Environment Management Practical</td>
<td>On completion of the course, students are able to apply their knowledge on: 1. Ecosystem of soil 2. GPS and related concepts 3. Soil and their texture 4. Population density 5. Treatment of municipal waste and Industrial effluents 6. Species variation and threatened species</td>
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<tr>
<td>65. 17BTU691</td>
<td>DSE – 6 Project</td>
<td>On completion of the project, students are able to apply their knowledge on this dissertation Programme provides: 1. Confidence in the basics and foundation of biotechnology concept and principles 2. General competence and analytical skills on an advanced level of molecular techniques 3. Accomplish the Need of industry, consultancy, and education and research fields. 4. Development of skill-based research experience 5. Hands on practice in the experiments 6. Expertise in the selected project field</td>
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</table>
**Name of the Department:** Biotechnology  
**Course:** M.Sc. Biotechnology

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<tr>
<th>Sl. No</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.    | 19BTP101    | Fundamentals of Biochemistry and Microbiology | On completion of the course, students are able to  
1. Draw or describe the structure of amino acids, proteins, enzymes, chemical messengers, carbohydrates, lipids, and nucleic acid  
2. Understand fundamental properties of elements, their role in formation of biomolecules and in chemical reactions within living organisms  
3. Write the chemical reactions involved in biochemical pathways that produce ATP such as citric acid cycle and electron transport  
4. Be familiar with the enzymes (biocatalysts), and their salient attributes including unique conformation and amazing catalytic properties  
5. Describe the metabolic pathways in microorganisms  
6. Designate the infectious organisms and treatment measures |
| 2.    | 19BTP102    | Cell Biology and Molecular Genetics      | On successful completion of the course, students will be able to  
1. Describe the structures and basic components of eukaryotic cells  
2. Illustrate how the cellular components are used for various cellular activities  
3. Demonstrate the pathways involved in various cellular events including cell cycle  
4. Understand the inheritance of genes among plants and animals and the genetic makeover as well as the physical appearance of organisms  
5. Describe Mendelian inheritance and the inheritance of gene in human beings  
6. Illustrate the effect of chromosomal abnormalities in human diseases |
| 3.    | 19BTP103    | Ecology, Evolutionary and Developmental Biology | On successful completion of the course, students should be able to  
1. Learn the fundamental principles and concepts of evolutionary theory and ecology  
2. Use this knowledge to explore the evolution  
3. Learn the basic ecological theory  
4. Understand the principles and proposing solutions to the major environmental problems facing the biosphere  
5. Describe evolutionary and ecological patterns and processes related to the survival  
6. Describe relationships, distribution, abundance and interactions of organisms, their populations and environments |
| 4.    | 19BTP104    | Bioinstrumentation and Biostatistics     | On successful completion of the course, students will be able to  
1. Demonstrate the bioinstrumentation principles with respect to device design and applications |
2. Identify, explain and judge safety issues related to biomedical instrumentation
3. Apply the principles of chromatography for the separation of bioactive compounds
4. Recognize the definition of statistics and its relation with the other sciences
5. Collect data relating to variable/variables which will be examined and calculate descriptive statistics from these data
6. Apply the statistical knowledge in analyzing biological problems

| 5. 19BTP105A | Biodiversity, Biosafety And IPR | On successful completion of the course, students will be able to
|              |                               | 1. Interpret basics of biosafety and its impact on all the biological sciences and the quality of human life
|              |                               | 2. Recognize importance of biosafety practices and guidelines in research
|              |                               | 3. Apply intellectual property law principles including copyright, patents, designs and trademarks to real problems and analyze the social impact of intellectual property law and policy
|              |                               | 4. Comprehend the importance of protection of new knowledge and innovations and its role in business
|              |                               | 5. Gain more insights into the regulatory affairs
|              |                               | 6. Describe various agreements and treaties related to the protection of intellectual property |

| 6. 19BTP105B | Nano-Biotechnology | On successful completion of the course, students will be able to
|              |                   | 1. Recognize the role of bio nanotechnology as an interdisciplinary tool and to understand how to use these new tools in solving biological problems
|              |                   | 2. Demonstrate the interactions and relationship between molecular dynamics, nanoscale physics and macroscopic system behaviour
|              |                   | 3. Explain biophysical mechanisms in the context of nanobiotechnology application areas
|              |                   | 4. Analyze and discuss the engineering requirements of multidisciplinary technology based on biology
|              |                   | 5. Explain the challenges of commercializing new technologies
|              |                   | 6. Demonstrate technical and cognitive skills associated with nanobiotechnology

| 7. 19BTP105C | Bio-energy Technology | On successful completion of the course, students will be able to
|              |                     | 1. Demonstrate bioenergy production processes adequate to diverse biomass characteristics
|              |                     | 2. Discuss state-of-the-art technologies of generating biofuels from sustainable bioresources
|              |                     | 3. Discuss and propose feasible biofuel technologies and biofuel products from selected biomasses
|              |                     | 4. To illustrate a bio-energy thermo-chemical conversion process
<p>|              |                     | 5. Design biogas reactor capacity and propose optimal and economically viable technical operational condition |</p>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>On successful completion of the course, students will be able to</th>
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<tbody>
<tr>
<td>19BTP111</td>
<td>Fundamentals of Biochemistry and Microbiology - Practical – I</td>
<td>6. Demonstrate sequential bioethanol and biogas production and compare the scenarios with respect to energy recovery</td>
</tr>
<tr>
<td>19BTP112</td>
<td>Cell Biology and Molecular Genetics - Practical – II</td>
<td>1. Interpret the outcome of experiments that involve the use of cell biology and molecular genetics techniques 2. Discuss the various macromolecular components of cells and their functions 3. Describe cell permeability in plants and animal cells 4. Explain the basic steps involved in <em>Drosophila</em> giant chromosome preparation and nuclear staining 5. Perform conjugation and transduction experiments 6. Do cell cycle analysis experiments</td>
</tr>
<tr>
<td>19BTP201</td>
<td>Recombinant DNA technology</td>
<td>1. Outline the fundamental steps in recombinant DNA technology 2. Demonstrate the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production 3. Explain the value of plasmid preparations and how the concentration and purity of plasmid samples can be determined 4. Confer cloning strategies and techniques used in DNA probing for specific genes of interest 5. Conceptualize PCR technique in clinical research 6. Recapitulate various applications of recombinant DNA technology in human health care and safety regulations</td>
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<tr>
<td>19BTP202</td>
<td>Fermentation and Bioprocess Technology</td>
<td>1. Evaluate factors that contribute in enhancement of cell and product formation during fermentation process 2. Analyze kinetics of cell and product formation in batch, continuous and fed-batch cultures 3. Differentiate the rheological changes during fermentation process 4. Develop protocol for scale-up and harvesting from shake flask to bench top fermenter</td>
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<td>12. 19BTP203</td>
<td>Enzyme Technology</td>
<td>On successful completion of the course, students will be able to:</td>
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<td>1. Demonstrate various enzyme process including delivery system for protein pharmaceuticals, structure function relationship in enzymes</td>
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<td>2. Describe the isolation and purification of industrially important enzymes</td>
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<td>3. Recognize how enzymatic pathways and regulatory networks function</td>
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<td>4. Appreciate the underlying mechanisms of Immobilized and soluble enzyme in health and industry</td>
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<td>5. Illustrate the role of artificial enzymes</td>
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<td>6. Apply the acquired knowledge of this course in enzymology research</td>
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| 13. 19BTP204 | Immunotechnology            | On successful completion of the course, students will be able to:          |
|             |                              | 1. Demonstrate various immunological process including innate and adaptive immunity, cells and organs of immune system, antigen and antibody interaction, immunogenicity and antigenicity, epitopes and antibody structure |
|             |                              | 2. Describe the organization of Ig genes, class switching in constant regions of genes and expression and regulation of Ig genes |
|             |                              | 3. Recognize how antigens are processed, presented and immune activation occurs via B- and T- cells activation |
|             |                              | 4. Appreciate the underlying mechanisms of autoimmune diseases and allergic reactions |
|             |                              | 5. Illustrate the role of cancer immunotherapy                             |
|             |                              | 6. Apply the knowledge of this course in research and pharmacological industries |

| 14. 19BTP205A | Pharmaceutical Biotechnology | On successful completion of the course, students will be able to:         |
|               |                             | 1. Evaluate different pharmaceutical parameters of current biotechnology products |
|               |                             | 2. Determine parameters related to stability and formulation of biotechnology products |
|               |                             | 3. Discuss quality control procedures related to biotechnology products         |
|               |                             | 4. Demonstrate novel formulation methods for better delivery of biotechnology derived drugs |
|               |                             | 5. Evaluate different techniques related to separation and purification of cell types; conduct techniques for measuring cell turnover and growth, conduct cytotoxicity assays |
|               |                             | 6. Join pharmaceutical biotechnology lab and industries as a research assistant |

<p>| 15. 19BTP205B | Agricultural Biotechnology  | On successful completion of the course, students will be able to:         |
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<th>Course Code</th>
<th>Course Title</th>
<th>On successful completion of the course, students will be able to</th>
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</table>
| 16. 19BTP205C | Industrial Toxicology                                                        | 1. Describe toxicology as a discipline in the overall health sciences framework  
2. Explain the basic concepts of chemical hazard and exposure as determinants of chemical toxicity  
3. Describe key pathways and mechanisms of chemical absorption, distribution, metabolism, storage and excretion in the human body  
4. Explain dose-response relationships as the basis of toxicity  
5. Outline the derivation of reference dose and other related measures of occupational exposure  
6. Describe the scientific basis of occupational exposure assessments and methods for their determination |
| 17. 19BTP211 | Recombinant DNA, Fermentation and Bioprocess Technology - Practical – III   | 1. Carry out DNA and RNA isolation from microbes, plants and animals  
2. Perform recombinant DNA techniques including restriction and digestion, ligation, transformation and PCR  
3. Explain the methods of wine production and alcohol determination  
4. Extract amylase enzyme from microbial sources  
5. Perform the enzyme immobilization assay  
6. Join in research and clinical labs as a project/research assistant |
| 18. 19BTP212 | Immuno- and Enzyme Technology - Practical – IV                              | 1. Carry out the immuno-laboratory techniques  
2. Explain the preparation of sample for analysis  
3. Describe the basic knowledge about antigen and antibody interaction using Rocket immune electrophoresis  
4. Perform various techniques like Immunoelectrophoresis, and ELISA etc.  
5. Perform the enzyme isolation and kinetics parameter calculations  
6. Join in research and clinical labs as a project/research assistant |
<p>| 19. 18BTP301 | Plant and Animal Biotechnology                                               | 1. Understand the growth conditions required to culture the plants and animal in <em>in vitro</em> conditions |</p>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>20. 18BTP302</td>
<td>Genomics, Proteomics and Bioinformatics</td>
<td>On successful completion of the course, students will be able to</td>
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<td>1. Have a clear understanding on the application of genetic markers in genome mapping</td>
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<td>2. Application of 2D technique to analyze the structure of protein</td>
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<td>3. Analyze the genomic and proteomic data</td>
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<td>4. Acquire knowledge and understanding of fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology</td>
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<td>5. Discuss how biological systems information relating to genes, proteins and cellular structures can be used to model living cells, and even to create new synthetic cells</td>
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<td>6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study</td>
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<td>21. 18BTP303</td>
<td>Food Biotechnology</td>
<td>On successful completion of the course, students will be able to</td>
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<td>1. Understand the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented food products</td>
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<td>2. Understand the significance and activities of microorganisms in food and role of intrinsic and extrinsic factors on growth and survival of microorganisms in foods</td>
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<td>3. Know the spoilage mechanisms in foods and thus identify methods to control deterioration and spoilage</td>
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<td>4. Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods</td>
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<td>5. Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries</td>
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<td>6. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation</td>
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<td>22. 18BTP304</td>
<td>Environmental Biotechnology</td>
<td>On successful completion of the course, students will be able to</td>
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<td>1. Demonstrate various types of ecosystems, biodiversity components, environmental threats and policy</td>
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<td>2. Discuss the impact of environmental pollution and its remediation measures</td>
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<td>Course Code</td>
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<td>Successful Completion</td>
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<tr>
<td>18BTP305A</td>
<td>Applied Biotechnology</td>
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<td>On successful completion of the course, students will be able to:</td>
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<td>1. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of plant biotechnology experiments</td>
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<td>2. Appreciate the applications of animal cell culture in clinical and biotechnology industries</td>
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<td>3. Apply the knowledge of stem cell therapy to cure dreadful diseases</td>
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<td>4. Demonstrate the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented food products</td>
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<td>5. Appreciate the scientific, ethical and/or social issues associated with certain applications of biotechnology for alleviating the environmental concerns</td>
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<td>6. Join biotechnology labs and industries as a research assistant</td>
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<tr>
<td>18BTP305B</td>
<td>System Biology</td>
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<td>On successful completion of the course, students will be able to:</td>
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<td>1. Understand the basic concepts of System Biology</td>
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<td>2. Differentiate various Metabolic Networks and Models in System Biology</td>
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<td>3. Understand the various databases available for data collection and interpretation</td>
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<td>4. Understand the scope and applications of tools</td>
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<td>5. Utilize the computational tools for applying biotechnology in research</td>
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<td>6. Study and deduce the molecular characterization of human genome</td>
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<tr>
<td>18BTP305C</td>
<td>Tissue Engineering and Regenerative Medicine</td>
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<td>On successful completion of the course, students will be able to:</td>
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<td>1. Describe and use the fundamental tools and techniques used in tissue engineering</td>
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<td>2. Compare and contrast various strategies for repairing tissues</td>
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<td>3. Show mastery of fundamental topics in tissue engineering including stem cells, plasticity, trans differentiation and cloning</td>
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<td>4. Describe and the developments of biomaterials for regenerative therapies and tissue Engineering</td>
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<td>5. Discuss and give an example of how biomaterials are used to fabricate devices for clinical use</td>
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<td>6. Illustrate the basic concepts of cell culture and critical components of bioreactor/tissue design</td>
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<td>26</td>
<td>18BTP311</td>
<td>Plant and Animal Biotechnology-Practical – V</td>
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<td>27</td>
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<td>28</td>
<td>18BTP491</td>
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Name of the Department: **Chemistry**

**Course**: B.Sc. Chemistry

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>19LSU101</td>
<td>Language –I</td>
<td>1. Explain the atomic theory of matter, composition of the atom, which defines the identity of a given element.</td>
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<td></td>
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<td>2. Understood the radial and angular part of orbitals.</td>
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<td>3. Explain the relative sizes, masses, and charges of the proton, neutron, and electron, and their assembly to form different atoms.</td>
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<td>4. Define the term isotope and their atomic and mass numbers.</td>
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<td></td>
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<td></td>
<td>2. Trained the learners to reflect on the literary works and communicate flexibly.</td>
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<td>3. Knowledge about the Prose and Poetry</td>
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<td>4. Development of the Short Story:</td>
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<td></td>
<td>5. Learnt about Vocabulary, Grammar and Composition:</td>
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<td>6. Knowledge about Proverb Expansion</td>
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<td></td>
<td></td>
<td></td>
<td>1. Enable the learners to acquire English language skills at a faster pace.</td>
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<td>6. Knowledge about Proverb Expansion</td>
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<td>1. Important tool for the study of physics and Chemistry.</td>
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<td>2. Basic mathematical tools like vector analysis</td>
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<td>3. Matrices</td>
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<td>4. Complex variables and analysis etc.</td>
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<td>5. Differential Calculus</td>
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<td>6. Integral Calculus</td>
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<td>2.</td>
<td>19ENU101</td>
<td>English</td>
<td>1. Enable the learners to acquire English language skills at a faster pace.</td>
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<td>2. Trained the learners to reflect on the literary works and communicate flexibly.</td>
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<td>3. Knowledge about the Prose and Poetry</td>
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<td>4. Development of the Short Story:</td>
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<td>5. Learnt about Vocabulary, Grammar and Composition:</td>
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<td>6. Knowledge about Proverb Expansion</td>
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<td>3.</td>
<td>19CHU101</td>
<td>Mathematics I</td>
<td>1. Explain the atomic theory of matter, composition of the atom, which defines the identity of a given element.</td>
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<td>2. Understood the radial and angular part of orbitals.</td>
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<td>3. Explain the relative sizes, masses, and charges of the proton, neutron, and electron, and their assembly to form different atoms.</td>
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<td>4. Define the term isotope and their atomic and mass numbers.</td>
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<td>5.</td>
<td>19CHU103</td>
<td><strong>Organic Chemistry I: Basics and Hydrocarbons</strong></td>
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<td></td>
<td>1. Describe molecular structure and bonding in organic molecules.</td>
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<td>2. Classify organic compounds by structure, use the IUPAC nomenclature, and identify conformational effects in organic compounds.</td>
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<td>3. Predict the products of reactions of alkenes and describe the mechanisms showing how the products are formed.</td>
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<td>4. Draw and interpret reaction coordinate diagrams, and relate the energetic changes associated with chemical reactions to equilibrium constants and rate; and differentiate kinetic versus thermodynamic control of reactions.</td>
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<td>5. Identify the types of isomerism in organic compounds, to identify and classify chiral centers, and explain the physical and chemical consequences of chirality.</td>
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<td>6. Correctly represent the structures and bonding of alkenes, and describe the mechanisms for reactions of alkenes and predict the products of such reactions.</td>
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<td>7. Identify compounds in which resonance is important, predict the effect of resonance on the stability of compounds and reactive intermediates, and draw resonance structures.</td>
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<td>8. Identify conjugated pi systems and explain the effect of conjugation on molecular structure and reactivity; and predict the products of reactions of dienes.</td>
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<td>9. Describe mechanisms for substitution and elimination reactions, and predict the effect of nucleophile, leaving group, and solvent on the relative rates of S 1 versus S 2 reactions, and E1 versus E2 reactions, as well as on the relative rates of substitution versus elimination.</td>
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<td>6.</td>
<td>19CHU111</td>
<td><strong>Mathematics I Practical</strong></td>
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<td>On successful completion of this course, the student will be able to</td>
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<td>1. Solve complicated matrix related problems like matrix inverse and matrix multiplication.</td>
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<td>2. Acquire problem-solving skills through computer programming.</td>
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<td>3. Plot various functions and parametric curves.</td>
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<td>4. Worked the various differentiation equation</td>
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<td>5. Worked the various integration equation</td>
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<td>6. Worked the mean, median, standard deviations.</td>
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<td>7.</td>
<td>19CHU112</td>
<td><strong>Atomic structure and Chemical Bonding-Practical</strong></td>
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<td>The Students are able</td>
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<td>1. Summarize the principles of volumetric analysis.</td>
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<td>2. Gained knowledge about the preparations of solutions</td>
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<td>3. Understood the preparation of appropriate concentrations, titrations</td>
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<td>4. Handled the respective apparatus while doing a titration.</td>
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</table>
5. Analyse the calculations involved in volumetric analysis and in the estimation of compounds using volumetric analysis.
6. The lab will also provide hands-on opportunities to develop and apply this knowledge.

| 8. | 19CHU113 Basics and Hydrocarbons-Practical | The student will be able to:
|    |                                             | 1. Purify organic compounds by crystallisation.
|    |                                             | 2. Characterisation of the compounds by elemental analysis, melting point, and effect of impurities on the melting point.
|    |                                             | 3. Separation of organic compounds by paper chromatographic and TLC methods.
|    |                                             | 5. The lab will also provide hands-on opportunities to develop and apply this knowledge.
|    |                                             | 6. Understood the principles of chromatography and to separate organic compounds by paper and thin layer chromatography.

| 9. | 19LSU201 Language –II | 1. இயற்கையின் தொழில்கலன் விளக்கத்தின் முடிவை விளக்கத்தின், ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, கூடிய தொழில்கலன் விளக்கத்தின், இயற்கைக் கலன் விளக்கத்தின் அறிவுவடையும்.
|    |                                             | 2. காண்பாற்றலும், பொருளக்கலன் விளக்கத்தின் காரணிகள் அறிவுவடையும் சிற்றுள்ளிட்டு, ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின்.
|    |                                             | 3. கூடிய தொழில்கலன் விளக்கத்தின், 'அறிவுவடையும் விளக்கத்தின்; இயற்கைக் கலன் விளக்கத்தின் அறிவுவடையும் சிற்றுள்ளிட்டு, ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின்.
|    |                                             | 4. ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின், ப்ளாண்டுக் கலன் விளக்கத்தின் ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின்.
|    |                                             | 5. ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின், ப்ளாண்டுக் கலன் விளக்கத்தின், ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின்.
|    |                                             | 6. ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின், ஸ்ரீலா வாலாந்தா சிற்றுள்ளிட்டு, இயற்கையின் தொழில்கலன் விளக்கத்தின்.

| 10. | 19CHU201 Mathematics II | On successful completion of this course, the students will be able to:
|     |                             | 1. Appreciate the physical significance of Fourier series.
|     |                             | 2. Understood the mathematical principles on transforms.
|     |                             | 3. Apply mathematical foundation to formulate and solve problems arising in physics.
|     |                             | 4. Synthesize numerical techniques for practical problems.
|     |                             | 5. Solving integration equation.

| 11. | 19CHU202 Physical Chemistry II: | 1. Apply the basic concepts of calculus to concepts in chemistry.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
</table>
2. Explain the chemistry of aryl halides.  
3. Contrast the preparation, properties and relative reactivity of alcohols and phenols  
4. Summarise Preparation, properties and standard reactions of carbonyl compounds  
5. Discuss the preparations, reactions and applications of epoxides, ethers and organometallic compounds  
6. List the preparations and properties of carboxylic acid and its derivatives. |
| 13. 19CHU211 | Mathematics II - Practical                       | On successful completion of this course, the student will be able to  
1. Familiarize with the programming environment for numerical methods.  
2. Develop proficiency in skills to solve the algebraic equations.  
3. Evaluate the definite integrals using computer programming techniques  
4. Numerical Integration – Simpson’s one third rule  
5. Numerical Integration – Simpson’s three eighth rule  
6. Numerical Integration – Trapezoidal rule |
| 14. 19CHU212 | Chemical Thermodynamics and its Application- Practical | It enables the students calculate  
1. The heat capacity of a calorimeter  
2. The enthalpy of neutralisation,  
3. Calculated the ionisation of solution.  
4. Calculated the enthalpy of hydration of salt.  
5. The integral enthalpy of solution  
6. The basicity of a diprotic acid |
| 15. 19CHU213 | Oxygen Containing Functional Groups- Practical   | The student knows to classify the  
1. Identification the organic functional groups like alcohols, phenols carbonyl and carboxylic acid groups  
2. Preparation organic compounds by acylation reactions  
3. Preparation organic compounds by benzoylation reactions.  
4. Iodoform reactions and selective reductions.  
5. Preparations semi carbazone derivatives of ketones |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. 19CHU301</td>
<td>Physics - I</td>
<td>1. Students will demonstrate proficiency in mathematics and the mathematical concepts to understand physics. 2. Students will design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes. 3. Students will demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data. 4. Knowledge about analog electronics 5. Learnt about amplifiers 6. Study about digital electronics</td>
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<tr>
<td>18. 19CHU302</td>
<td>Inorganic Chemistry III: Coordination Chemistry</td>
<td>The students have gained knowledge to summarize 1. Recognize the role played by transition metal complexes play in Inorganic Chemistry. 2. Understood the nomenclature, isomerism and types in coordination compounds. 3. Describe the structure and bonding theories, electronic and magnetic properties of the transition metal complex and their kinetic studies. 4. Explain the theories of bonding in coordination compounds and their experimental behaviour. 5. Recognize and explain the interaction of metal ions with biological ligands. 6. Explain the role of Inorganic “substances” in living systems and the use of metal ions in medicinal therapy and diagnosis.</td>
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<tr>
<td>19. 19CHU303</td>
<td>Physical Chemistry III: Phase Equilibria and Chemical Kinetics</td>
<td>The students have gained knowledge to summarize 1. The concept of Phase equilibria and phase diagrams 2. Understood the Clacio-Clapeyron equation and its applications. 3. About three component systems and their characteristic properties 4. Different types of electrochemical cells and EMF measurements 5. Applications of EMF measurements in determining thermodynamic properties 6. The basics of surface chemistry.</td>
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<td>Course Code</td>
<td>Course Title</td>
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</tbody>
</table>
| 6. | 19CHU304B   | IT skills for chemists        | 1. Interpret the Uncertainty in experimental techniques and Statistical treatment  
2. Understood the knowledge of error analysis.  
3. Formulate a set of calculations that can address a relevant research question.  
4. Use one or several computer programs and extract useful information;  
5. Write a research paper that describes methods, results, and interpretation.  
6. Assess the meaning and validity of calculations that appear in the chemical literature. |
| 21.| 19CHU311    | Physics-I Practical Students  | Students can able to  
1. Perform basic experiments in mechanics and electricity and analyze the data.  
2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.  
3. Knowledge about the physical Principles and applications of Electronics.  
4. Work efficiently in the Young modulus, rigidity modulus  
5. Refractive Index of a liquid prism-Spectrometer  
6. Thickness of a thin wire-Air wedge method |
| 23.| 19CHU312    | Coordination Chemistry - Prac | The students have to  
1. Determine metals like Ni, Cu and Fe using the principle of gravimetric analysis  
2. Estimate the amount of nickel present in the NiDMG  
3. Prepare coordination complexes  
4. Measurement of 10 Dq by spectrophotometric method  
5. Justify the properties of coordination complexes.  
6. Synthesis of ammine complexes of Ni(II) and its ligand exchange reactions (e.g. Bidentate ligands like acetylacetone, DMG, glycine) by substitution method. |
| 24.| 19CHU313    | Phase Equilibria and Chemical | The students able to determine,  
1. Apply their knowledge in Phase equilibria  
2. Determination of critical solution temperature (CST) and  
3. Determination of eutectic temperature  
5. Apply their knowledge in Potentiometry to laboratory.  
6. Perform the titrations potentiometrically. |
| 25.| 19CHU314A   | Pharmaceutical Chemistry - Prac | The students restate the  
1. Synthesis of pharmaceutical drugs like aspirin  
2. Synthesis of magnesium bisilicate.  
3. Determination of the melting point of aspirin  
4. Spectral characterization of aspirin  
5. Determine the melting point of antacid  
6. Spectral characterization of antacid |
<table>
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<tr>
<th>No.</th>
<th>Code</th>
<th>Course Title</th>
<th>Summary</th>
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<tbody>
<tr>
<td>26.</td>
<td>19CHU314B</td>
<td>IT skills for Chemists - Practical</td>
<td>The students have to explained the</td>
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<td>1. The rules and the methods to be followed in the computer programming.</td>
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<td>2. the basic programme of curve fitting</td>
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<td>3. The numerical differentiation and integration.</td>
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<td>4. Interpretation of Statistical analysis of the numeric data.</td>
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<td>5. Draw the chemical structure using software</td>
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<td>6. Under stood the statistical significance testing.</td>
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<td>27.</td>
<td>19CHU401</td>
<td>Physics II</td>
<td>The students have gained knowledge about</td>
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<td>1. Basic natural processes of Physics</td>
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<td>2. Gained about elasticity of solids.</td>
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<td>3. Learned about Einstein’s photoelectric effect.</td>
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<td>4. Understood the basics of surface tension.</td>
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<td>5. Laser physics</td>
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<td>6. Gained knowledge about solar physics</td>
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<td>28.</td>
<td>19CHU402</td>
<td>Physical Chemistry IV: Electrochemistry</td>
<td>The students have to restate</td>
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<td>1. The types of conductance measurements and the factors affecting it.</td>
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<td>2. The ionic mobilities and the applications of conductance measurements</td>
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<td>3. The order and molecularity of reactions and the integrated rate expressions for different types of first order reactions.</td>
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<td>4. Gained knowledge about chemical kinetics.</td>
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<td>5. The fundamentals of catalysis</td>
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<td>6. The fundamentals of photochemistry.</td>
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<tr>
<td>29.</td>
<td>19CHU403</td>
<td>Organic Chemistry IV: Organic Spectroscopy</td>
<td>The Student have gained knowledge about</td>
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<td>1. The principle and the theory behind the UV spectroscopy.</td>
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<td>2. The principle and the theory behind the IR spectroscopy.</td>
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<td>3. The principle and the theory behind the NMR spectroscopy.</td>
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<td>4. The occurrence, classification and their biological importance carbohydrates</td>
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<td>5. The classification of dyes</td>
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<td>6. Preparation, types, properties and uses of polymers.</td>
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<td>2. Knowledge about the special emphasis of an atom economy.</td>
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<td>3. Demonstrate the knowledge of the twelve principles of Green Chemistry which they can apply to a range of work places for a safer, less toxic and heal their environment.</td>
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<td>4. Described the process involved in the real word cases like Surfactants for CO₂</td>
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<td>5. Synthetic azo pigments to replace toxic organic and inorganic pigments.</td>
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<td>6. Determination of environmentally safe marine antifoulant and plastic (poly lactic acid) made from corn.</td>
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</table>
| 31.  | 19CHU404B | Analytical Clinical Biochemistry | The students have knowledge to categorize  
1. The basic structure of carbohydrates.  
2. Classification and biological importance of Proteins.  
3. Classification and biological importance of lipids.  
4. Properties, functions and biochemical functions of steroid hormones  
5. Knowledge about enzyme, classification, mechanism and factors affecting enzyme activity.  
6. The biochemistry of diseases. |
| 32.  | 19CHU411 | Physics II-Practical | 1. Field Intensity-Circular coil- Vibration magnetometer  
2. Co-efficient of thermal conductivity-Lee’s disc method  
3. Refractive Index of a prism (I-I’ ) curve-Spectrometer  
4. Moment of a magnet-Circular Coil-Deflection Magnetometer  
5. Temperature coefficient of resistance of a thermistor-Post office box  
6. Comparison of viscosities of two liquids  
7. Study of logic gates using IC’s  
8. Study of NOR gate as Universal building block.  
9. Study of NAND gate as Universal building block.  
10. Verification of Basic logic gates using discrete components.  
11. Determination of Cauchy’s constant – Spectrometer  
12. AC frequency – Sonometer |
| 33.  | 19CHU412 | Physical Chemistry IV: Electrochemistry-Practical | The Student have interpreted to  
1. Measured the conductance  
2. Determination of the cell constant  
3. Determination of conductometric titrations  
4. The kinetic aspects and rate measurements of different types of reactions.  
5. Determination the Acid hydrolysis of methyl acetate with hydrochloric acid.  
6. Determination of the Saponification of ethyl acetate |
| 34.  | 19CHU413 | Organic Spectroscopy - Practical | The students have to categorize and demonstrate  
1. About the Extraction of caffeine from tea leaves.  
2. The Preparation of urea formaldehyde resin  
3. The qualitative analysis of unknown organic compounds  
4. Identify simple organic compounds by IR spectroscopy  
5. Identify simple organic compounds by NMR spectroscopy  
6. The Preparation of methyl orange |
| 35.  | 19CHU414A | Green Methods in Chemistry - Practical | The students have to use  
1. The basic principles and practical aspects like preparations and characterization in green approach.  
2. Preparation and characterization of biodiesel from vegetable oil.  
3. Characterization of biodiesel from vegetable oil.  
4. Preparation of phthalocyanine complex of Cu(II).  
5. Mechano-chemical solvent free synthesis of azomethine.  
6. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II). |
<table>
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<tr>
<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Students' Activities</th>
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</thead>
<tbody>
<tr>
<td>36.</td>
<td>19CHU414B</td>
<td>Analytical Clinical Biochemistry-Practical</td>
<td>The students have to perform 1. The Identification and estimation of carbohydrates, iodine number and saponification number of oils 2. The Identification and estimation of lipids. 3. Estimation of the iodine number of oils 4. Determination the saponification number of oils. 5. Determination of Cholesterol 6. The determination of proteins</td>
</tr>
<tr>
<td>37.</td>
<td>19CHU501A</td>
<td>Cheminformatics</td>
<td>The students have presented the knowledge about 1. The principles of cheminformatics 2. The Representation of molecules and chemical reactions 3. The searching methods for chemical structures 4. The prediction of the properties of molecules using computational methods 5. QSAR studies 6. The computer assisted structure elucidations</td>
</tr>
<tr>
<td>38.</td>
<td>19CHU501B</td>
<td>Chemistry of Cosmetics and perfumes</td>
<td>The students have formulated the knowledge about 1. The preparation of hair dyes, hair spray and shampoos 2. The preparation and uses of lotions, 3. The preparation and uses of lipsticks and 4. The preparation and uses of talcum powder 5. The preparation and uses of creams 6. The chemistry of essential oils</td>
</tr>
<tr>
<td>41.</td>
<td>19CHU503</td>
<td>Nitrogen containing functional groups, Heterocyclic Chemistry and Natural products</td>
<td>The students will summarise 1. The preparation and properties of compounds with nitrogen containing functional groups. 2. Understood the preparation and properties of diazonium salts. 3. Learned about the polynuclear hydrocarbons. 4. Knowledge about five, six and fused membered heterocyclic compounds. 5. The preparation and reactions of alkaloids 6. The preparation and reactions of terpenes.</td>
</tr>
<tr>
<td>42.</td>
<td>19CHU504</td>
<td>Inorganic Chemistry II: Metallurgy, s-</td>
<td>It enabled the students have discuss 1. The basic principles and methods involved in the metallurgy</td>
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<td>43.</td>
<td>19CHU511A Cheminformatics - Practical</td>
<td>The students know to perform the cheminformatics aspects in the drug designing process.</td>
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<td>1. Applied the applications of cheminformatics in drug design.</td>
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<td>2. Draw the chemical structure using ChemDraw software.</td>
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<td>3. Molecular docking studies were carried using AutoDock software.</td>
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<td>4. Prediction ADME using swissadme software</td>
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<td>5. Learned Lipinski’s rule of five using swiss ADME software.</td>
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<td>6. Prediction of drug likeness</td>
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<td>44.</td>
<td>19CHU511B Chemistry of Cosmetics and Perfumes - Practical</td>
<td>Students have knowledge to compose about the</td>
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<td>1. Preparation of talcum powder.</td>
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<td>2. Preparation of shampoo.</td>
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<td>3. Preparation of enamels.</td>
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<td>4. Preparation of hair remover.</td>
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<td>5. Preparation of face cream.</td>
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<td>6. Preparation of nail polish and nail polish remover.</td>
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<td>45.</td>
<td>19CHU512A Polymer Chemistry - Practical</td>
<td>The students will demonstrate and perform</td>
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<td></td>
<td></td>
<td>1. The preparation of different types of polymers by various methods</td>
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<td>2. The purification of polymers</td>
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<td>3. The characterization the polymers by chemical and instrumental methods.</td>
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<td>4. Preparation of isophthaloyl chloride</td>
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<td>5. Determination of hydroxyl number of a polymer using colorimetric method</td>
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<td>6. Analysis of the polymers</td>
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<td>46.</td>
<td>19CHU512B Novel inorganic Solids - Practical</td>
<td>The students have demonstrated</td>
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<td>1. The cation exchange method</td>
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<td>2. The ion exchange method</td>
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<td>3. coprecipitation methods of novel inorganic solids</td>
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<td>4. The method for the preparation of nanoparticles</td>
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<td>5. Nano particle preparation using green method</td>
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<td>6. Preparation of the hydrogel by coprecipitation method</td>
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<td>47.</td>
<td>19CHU513 Nitrogen containing functional groups, Heterocyclic Chemistry and Natural products – Practical</td>
<td>The students will analyse the</td>
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<td>1. Functional group tests for nitrogen containing organic compounds</td>
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<td></td>
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<td>2. Identification of nitro group</td>
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<td>3. Identification of amine group</td>
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<td>4. Identification of amide</td>
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<td>5. Tests used in the Identification of functional groups like alcohols, carboxylic acids</td>
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- s-block Elements
- p-block Elements
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<tr>
<th></th>
<th>Course Code</th>
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<th>Description</th>
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<tbody>
<tr>
<td>49.</td>
<td>19CHU601A</td>
<td>Basic Analytical Chemistry</td>
<td>The course enables the students have to interpret 1. The interdisciplinary nature of analytical chemistry 2. The various methods involved in the analysis of soil, 3. Analysis water 4. Analysis of food products 5. Concepts of pH 6. The various methods involved in the analysis of cosmetics</td>
</tr>
<tr>
<td>50.</td>
<td>19CHU601B</td>
<td>Pesticide Chemistry</td>
<td>The students have designed 1. The synthesis and manufacture of many natural fertilizers 2. The synthesis and manufacture of many synthetic fertilizers 3. The synthesis and manufacture of organochlorines 4. The synthesis and manufacture organophosphorus compounds 5. The synthesis and manufacture of quinine pesticides 6. The synthesis and manufacture of anilides</td>
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<tr>
<td>51.</td>
<td>19CHU602</td>
<td>Inorganic Chemistry IV: Organometallic Chemistry</td>
<td>The student have discussed 1. The Theoretical Principles in Qualitative Analysis to identify the cations and anions 2. The classification of organometallic compounds based on bond type 3. Few important metal complexes of commercial importance 4. About 18 electron rule 5. The catalytic property of organometallic compounds. 6. The Metal ions present in biological systems</td>
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<tr>
<td>52.</td>
<td>19CHU603</td>
<td>Physical Chemistry I: States of Matter and Ionic Equilibrium</td>
<td>Students are able to 1. Explain the origin of Keq and its relation to fugacity and activity and apply these concepts to ideal and real solutions of electrolytes and non-electrolytes and to colligative properties. 2. Apply the principles of electrochemistry to conductance, voltaic, and electrolytic systems. 3. Provide a physical basis for Debye-Huckel theory. 4. List the methods for arriving at a plausible mechanism and/or rate law based on kinetic information. 5. Manipulate the gas laws to describe real and ideal gas behavior. 6. Apply the steady-state hypothesis to obtain rate equations. Explain the basic principles of photochemical and radiation-chemical reactions.</td>
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<tr>
<td>53.</td>
<td>19CHU604</td>
<td>Molecular modeling and drug design</td>
<td>The students are contrast 1. The introductory concepts of molecular modelling</td>
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| 54. 19CHU611A | Basic Analytical Chemistry-Practical              | The course enables the students to interpret  
1. Estimation of macro nutrients  
2. The various methods involved in the analysis of soil  
3. Analysis of water  
4. Analysis of food products  
5. The various methods involved in the analysis of cosmetics  
6. Spectrophotometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drink  
7. Spectrophotometric determination of Iron in Vitamin |
| 54. 19CHU611B | Pesticide Chemistry-Practical                    | The students have solved  
1. The calculation of acidity in given sample of pesticide formulation  
2. The calculation of alkalinity in given sample of pesticide formulation  
3. The synthesis of simple organophosphates  
4. The synthesis of phosphonates  
5. The synthesis of thiophosphates  
6. Analysis of organophosphates, phosphonates and thiophosphates |
| 54. 19CHU612  | Organometallic Chemistry-Practical               | The students have  
1. Identified the anions and the cations in a mixture by Qualitative semi micro analysis  
2. Understood the chemistry of different reactions.  
3. Identified the interfering anion  
4. Define the principles behind the spot tests and  
5. Define the Principles of chromatographic separations  
6. Paper chromatographic separation of nickel and cobalt, copper and cadmium |
| 54. 19CHU613  | Physical Chemistry I: States of Matter and Ionic Equilibrium-Practical | The students develop the practical skill have categorized the  
1. Determination of surface tension of a liquid  
2. Determination the viscosity of a liquid  
3. Prepare a buffer solution and to measure the pH of a solution  
4. Monitor the pH of a solution during the course of a titration.  
5. The lab will also provide hands-on opportunities to develop and apply this knowledge  
6. Indexing of a given powder diffraction pattern of a cubic crystalline system. |
| 54. 19CHU614  | Molecular modeling and drug design practical      | The students have analysed  
1. The Qualitative and qualitative calculations involved in the molecular modelling and its usefulness in drug design  
2. Comparison of the optimized C-C bond lengths in ethane, ethene, ethyne and benzene. Visualize the |
1. The firm foundations in the fundamentals and application of current chemical and scientific theories.
2. Students are able to identify and solve chemical problems and explore new areas of research.
3. Students are skilled in problem solving, critical thinking and analytical reasoning.
4. Students should have the ability to identify organic compounds by analysis and interpretation of spectral data.
5. Students should have the ability to explain common terms in NMR spectroscopy such as chemical shift, coupling constant and anisotropy and describe how they are affected by molecular structure.
6. Students are skilled to perform the most commonly used NMR experiments and to interpret and document their results.
### Course Outcomes

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</table>
| 1.     | 19CHP101    | Organic Chemistry-I (Reaction Mechanism) | 1. Learned the concept aromaticity and various types of aromaticity  
2. Familiarized the various types of electrophilic and nucleophilic substitution reactions and their Mechanism  
3. Learned the familiar addition and elimination reactions  
4. Learned the concept of reaction intermediates.  
5. Understood about the synthesis of aromatic compounds using electrophilic and nucleophilic substitution, addition and elimination reactions.  
6. Described the various organic reaction mechanisms. |
| 2.     | 19CHP102    | Inorganic Chemistry-I (Nuclear Chemistry and Metallic Clusters) | 1. Described the basic concepts of nuclear chemistry and types of nuclear reactions.  
2. Discriminate the various defects and also known about its application on inorganic crystals  
3. Understood the Basics of metallic clusters, preparation, properties and applications of metallic clusters  
4. Learned the structure and bonding in molecules / ions and predict the structure of molecules / ions.  
5. Described the type of defects in metals and about semi-conductors  
6. Understood the inorganic and organometallic chemistry, catalysis in the molecular level |
| 3.     | 19CHP103    | Physical Chemistry-I (Quantum Chemistry and Group Theory) | 1. The differences between classical and quantum mechanics. The limitations of classical mechanics.  
2. The connection of quantum mechanical operators to observables  
3. Probabilities, amplitudes, averages, expectation values, and observables  
4. How molecular phenomena can be related to model problems  
5. The fundamentals of group theory  
6. The connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals, for example)  
7. Identified the point groups of molecules and apply the concept of group theory to predict the spectroscopic properties. |
| 4.     | 19CHP104    | Organic and Inorganic Spectroscopy | On completion of this course, students to have  
1. Understood the basic concepts of Electronic and IR spectroscopy.  
2. Understood the valuable concepts in NMR spectroscopy.  
3. Learned the basic knowledge about Mass spectroscopy. |
| 5. | 19CHP105A | Elective-I Green Chemistry | The student understood the following:  
1. Designed of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.  
2. Created awareness for reducing waste, minimizing energy consumption in organic synthesis.  
3. Implemented techniques of green synthesis in organic reactions.  
4. Used the various alternative resources for green technology in organic synthesis.  
5. Understood the various greener synthetic pathways and implement it in the production of pharmacological compounds.  
6. Applied the concept of microwaves and ionic liquids in various chemical reactions. |
| 6. | 19CHP105B | Elective-I Medicinal Chemistry | On the completion of the course, students to:  
1. Understood the basics of Medicinal chemistry.  
2. Knew the drug targets, drug metabolism and about clinical training.  
3. Understood in-silico techniques involved in drug development.  
4. Discussed about membrane and receptors in drug delivery process.  
5. Applied the various theoretical laws to predict the pharmaco-kinetics of the compounds.  
6. Analyzing the molecular receptor binding and molecular recognition of the natural and synthetic compounds. |
| 7. | 19CHP105C | Elective-I Molecular modelling and drug design | On completion of this course, students have:  
1. Gained the knowledge on the molecular modelling and field effects as a part of drug discovery.  
2. Understood on the various stages and various targets of drug discovery.  
3. Learned the importance of the pharmacophores in drug discovery.  
4. Studied the importance of the role of computer aided drug design in drug discovery.  
5. Practiced some online softwares to predict the physical and biological properties of natural/synthesized molecules.  
6. Applied the in-silico techniques to evaluate the drug-receptor binding affinities of the compounds. |
| 8. | 19CHP111 | Organic Chemistry-I (Qualitative analysis and single stage preparation) | Students have to:  
1. Learned about the qualitative analysis by semi micro-qualitative analysis method.  
2. Learned the preparation of inorganic complexes.  
3. Described the basic concept and advantages of semi-micro qualitative analysis. |
4. Understood the systematic separation d-block elements
5. Studied the step wise procedure to predict the anions along with metals
6. Identified the d-block elements with their special tests.

| 9. 19CHP112 | Organic Chemistry-II (Quantitative analysis and double stage preparation) | On successful completion of the course the students should have
1. Learned about the basic principles about quantitative analyses.
2. Studied the concepts and systematic procedure in gravimetric analysis.
4. Described the synthesis method for in-organic coordination complexes
5. Known about separate the molecules and identify its nature through chromatography technique.
6. Applied this ideas and concepts to water treatment process, food science and forensic fields. |

| 10. 19CHP201 | Organic Chemistry-II (Rearrangements, Reactions, Photochemistry and Pericyclic reactions) | On successful completion of the course the students should have
1. Understood the versatile knowledge of rearrangements
2. Understood the different organic reactions (radical and concerted).
3. Learned about the principle of conformational analysis and stereochemistry.
4. Explained about the molecular rearrangements, Pericyclic reactions and Cyclo-addition and sigmatropic reactions
5. Described the basic ideas of pericyclic reactions.
6. Designed new form of organic compounds using these basic concepts. |

| 11. 19CHP202 | Inorganic Chemistry-II (Coordination Chemistry) | On the completion of this course, students should have
1. Learned how to name coordination compounds and to be able to draw the structure based on its name
2. Used Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds
3. Described the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them
4. Recognized the types of coordination compounds like metal carbonyls, carbocyclic pi complexes in coordination compounds
5. Familiar with some reactions and applications of coordination compounds
6. Predicted the geometric shapes of simple molecules |

| 12. 19CHP203 | Physical Chemistry-II (Chemical Kinetics and Electrochemistry) | On the completion of this course, students have to
1. Understood theories of reaction rates, how reaction rates are measured and represented in rate laws.
2. Understood the applications of chemical kinetics in studying enzyme mechanisms |
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| 3   |             |              | 3. Provided the knowledge of coulometric methods and applications.  
|     |             |              | 4. Evaluated the electrochemical principles involved in corrosion and energy storage.  
|     |             |              | 5. Remembered the basic polarography techniques.  
|     |             |              | 6. Understood the theories of catalysis and types of catalysis  |
| 13  | 19CHP204    | Industrial Chemicals and Environment | The course enables the students to  
|     |             |              | 1. Understood the industrial gases and inorganic chemicals which have an impact on the environment.  
|     |             |              | 2. Studied about the general principles of metallurgy.  
|     |             |              | 3. Learned the environment and its segments.  
|     |             |              | 4. Discussed about the water pollution and water treatment.  
|     |             |              | 5. Explained the application of bio-catalysis in energy saving techniques.  
|     |             |              | 6. Applying this technique to design energy saving devices with eco-friendly method.  |
| 14  | 19CHP205A   | Elective-II Research Methodology for Chemistry | On the completion of this course, students to  
|     |             |              | 1. Understood how to do literature survey about a particular scientific problem.  
|     |             |              | 2. Learned about the digital sources available for the literature collection.  
|     |             |              | 3. Studied the methods of doing scientific research and how to write scientific papers.  
|     |             |              | 4. Discussed about the chemical safety and ethical handling of chemicals.  
|     |             |              | 5. Understood about the data analysis.  
|     |             |              | 6. Knew about, how to handle the chemicals in safer way and how to analysis the data.  |
| 15  | 19CHP205B   | Elective-II Analytical Chemistry | On successful completion of the course the students should have to  
|     |             |              | 1. Learned about quantitative inorganic analysis.  
|     |             |              | 2. Understood the different colorimetric analysis.  
|     |             |              | 3. Learned the electrochemical methods of analysis.  
|     |             |              | 4. Understood the different chromatographic techniques.  
|     |             |              | 5. Learned about how to analyze the data obtained.  
|     |             |              | 6. Explained the various analytical techniques for inorganic compounds  |
| 16  | 19CHP205C   | Elective-II Organometallic Chemistry | On the completion of the course, Students to  
|     |             |              | 1. Learned about the Alkyls and Arene complexes  
|     |             |              | 2. Understood the bonding in olefin, acetylene and allyl systems  
|     |             |              | 3. Known about the concepts of synthesis, structure and bonding in metalloccenes  
|     |             |              | 4. Understood the Organometallic reaction mechanisms and its applications  
|     |             |              | 5. Learned about the Catalysis, hydrogenation of olefins and oxoprocess  
|     |             |              | 6. Studied the concept of oxidation of olefins and polymerization.  |
| 17  | 19CHP211    | Inorganic Chemistry Practical-I | After completion of this course, Students have to  
<p>|     |             |              | 1. Learned about the qualitative analysis by semi micro-qualitative analysis method.  |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| 18. 19CHP212 | Inorganic Chemistry Practical - II (Quantitative Analysis and Complex Preparations) | 2. Learned the preparation of inorganic complexes.  
3. Described the basic concept and advantages of semi-micro qualitative analysis.  
4. Understood the systematic separation d-block elements  
5. Studied the step-wise procedure to predict the anions along with metals  
6. Identified the d-block elements with their special tests. |
| 19. 19CHP301 | Organic Chemistry – III (Natural Products)        | On successful completion of the course, the students should have  
1. Learned about the basic principles about quantitative analyses.  
2. Studied the concepts and systematic procedure in gravimetric analysis.  
4. Described the synthesis method for inorganic coordination complexes  
5. Known about separate the molecules and identify its nature through chromatography technique.  
6. Applied these ideas and concepts to water treatment process, food science and forensic fields. |
| 20. 19CHP302 | Physical Chemistry - III (Thermodynamics)         | On the completion of this course, students should have to  
1. Understood the Importance of drinking water  
2. Learned the factors to produce water pollution  
3. Studied the parameters to be checked during water analysis.  
4. Create small water sewage treatment plant ideas and reuse the treated water  
5. Knew the various water treatment processes.  
6. Applying the concepts to control the water pollution in the environment. |
| 21. 19CHP303 | Physical Methods in Chemistry (Instrumentation)    | Completion of this course, the students have to  
1. Understood different chromatographic methods.  
2. Discussed about electron spectroscopy and thermal analysis  
3. Learned Circular Dichroism and Optical Rotatory Dispersion  
4. Described the Electron Spin Resonance spectroscopy  
5. Knew about flame emission spectroscopy. |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
</table>
| 22. 19CHP304 | Nanochemistry                      | The completion of this course, students have to  
1. Knew about the history and perspectives of Nanotechnology.  
2. Learned about the various types and significant of 1D, 2D and 3D nanoparticles  
3. Remembered the various types of nanoparticles and its application.  
4. Discussed about carbon-based nanomaterials and its properties.  
5. Explained the metal oxide based nano materials  
6. Motivated and lead them in the pathway of nanotechnology |
| 23. 19CHP305A | Polymer Chemistry                  | After completion of this course, the students have to  
1. Studied about the basic concepts of polymerization.  
2. Explained the coordination polymerization and apply the Ziegler-natta catalyst in polymer synthesis.  
3. Understood the molecular weight determination methods of the polymer and apply it identifies the polymer properties.  
4. Discussed about the polymer processing and properties of commercial polymers  
5. Applied the polymer processing technique to prepare the polymer products  
6. Remembered the commercial polymers and its application |
| 24. 19CHP305B | Textile Chemistry                 | On the successful completion of this course, Students  
1. Understood about the classification, Chemical structure, production, properties and uses of fibers.  
2. Learned about the dyeing process on fibres.  
3. Discussed the classification of dyes  
4. Learned the Pollution Control in Textile Industry.  
5. Explained the various finishing process of fibres.  
6. Applied these fundamentals to fabricate the material and its dying process. |
| 25. 19CHP305C | Industrial Chemistry             | On the completion of this course, student should  
1. Knew the knowledge of the role of metals in human body  
2. Learned about the physical methods in bioinorganic chemistry, metal biomolecules interactions, complexes, and drug discovery.  
3. Understood the knowledge in Binding of Metal Ions and Complexes to Biomolecules  
4. Learned about complexes and chelating agents  
5. Provided the fundamental knowledge in Drug Discovery and Design  
6. Applied these parameters to discover new pharmacokinetic molecules. |
| 26. 19CHP311 | Physical Chemistry Practical - I (Molecular Weight Determination and  | On the completion of this course, students to  
1. Learned about the heat of solution, determination of molecular weight and distribution coefficient  
2. Studied about basic concepts of conductometric titrations. |
<table>
<thead>
<tr>
<th>27.</th>
<th>19CHP312</th>
<th>Physical Chemistry Practical - II (Chemical Kinetics and Potentiometric Titrations)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>On the completion of this course, students to</td>
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<tr>
<td></td>
<td></td>
<td>1. Learned about the principles of electrochemistry and determination EMF</td>
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<td>2. Understood about the basic needs of Chemical Kinetics and Potentiometric titrations.</td>
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<tr>
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<td>3. Studied the principles about adsorption process.</td>
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<td>4. Knew about how to handle the potentiometer, electrodes and spectrophotometers.</td>
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<td>5. Applying the knowledge of chemical kinetics in various preparation organic/inorganic compounds.</td>
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<td>6. Investigating the metal concentration in water samples using adsorption technique.</td>
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<tr>
<td>Sl. No.</td>
<td>Course Code</td>
<td>Name of the Course</td>
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</tr>
</tbody>
</table>
| 1      | 19LAU101     | Language - I       | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment.  
5. Communication skills will get developed.  
6. Develop to have language competence. |
| 2      | 19ENU101     | English – I        | 1. Comprehend the accounting concepts, principles and to comply the accounting standards.  
2. Prepare the final accounts and compute inventory valuation.  
3. Recognize the accounting process of financial statement and critically think in preparing accounts, rectification of errors, Consignment and Joint Venture.  
4. Acquire knowledge on accounting for branches and also to ascertain the financial position of each branch separately.  
5. To apply appropriate judgment derived from knowledge of accounting theory to prepare and validate the accuracy of financial statements.  
6. Use information to support business processes and practices, such as problem analysis and decision making. |
| 3      | 19CCU101     | Financial Accounting | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment.  
5. Communication skills will get developed.  
6. Develop to have language competence. |
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<tr>
<th>Course Code</th>
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<th>Description</th>
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</table>
| 19CCU102    | Introduction to Information Technology | 1. Prepare documents and reports for the organization.  
2. Prepare datasheet and apply the built-in functions for analyzing the data to support decision making.  
3. Utilize visual aids and tools to present the data  
4. Design the presentations for the business meetings  
5. Store, retrieve data and make decisions based on the information.  
6. To improve the way in which we live, to make our lives easier by reducing paperwork. |
| 19AEC101    | Business Communication | 1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.  
2. Draft business correspondence for the organization requirement.  
3. Prepare business reports for organization needs.  
4. Use appropriate technology for business communication.  
5. Draft the resume and develop skills to face the interview.  
6. Expertise that the learner will get from a learning activity |
| 19CCU111    | Introduction to Information Technology (Practical) | 1. Prepare documents and reports for the organization.  
2. Prepare datasheet and apply the built-in functions for analyzing the data to support decision making.  
3. Utilize visual aids and tools to present the data  
4. Design the presentations for the business meetings  
5. Store, retrieve data and make decisions based on the information.  
6. Keep information safe and make it easier to provide service delivery. |
| 19LAU201    | Language – II | 1.  
2.  
3.  
4.  
5.  
6. |
<p>| 19ENU201    | English – II   | 1. Learn to enjoy the ecstasy of literature. |</p>
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<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>9. 19CCU201</td>
<td>Business Law</td>
<td>1. Identify the basic legal principles behind contractual agreements.</td>
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<td>2. Understand the relevance of business law in economic and social context.</td>
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<td>3. Acquire problem solving techniques and will be able to present coherent,</td>
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<td>concise legal argument in partnership for achieving common goals.</td>
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<td>4. Exhibit attributes in understanding various negotiable instruments, its</td>
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<td>features and utilization in real-time.</td>
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<td>5. Obtain the capacity to do lifelong learning in modifications and revision</td>
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<td>done in the legal environment of business.</td>
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<td>6. Basic and broad knowledge in business laws in management.</td>
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<td>10. 19CCU202</td>
<td>Business Mathematics and Statistics</td>
<td>1. Utilize the concept of matrices, differential calculus to solve business</td>
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<td></td>
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<td>problems</td>
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<td>2. Calculate and apply the measure of central tendency and dispersion in</td>
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<td>decision making.</td>
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<td>3. Evaluate the relationship and association between variables to formulate</td>
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<td>the strategy in business.</td>
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<td>4. Apply the concept of index numbers and trend analysis in business</td>
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<td>decisions.</td>
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<td></td>
<td>5. Demonstrate capabilities as problem-solving, critical thinking, and</td>
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<td>communication skills related to the discipline of statistics.</td>
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<td>6. Analyze problems in economics, business, and accounting to determine</td>
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<td>appropriate methods for solving them using business math concepts and</td>
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<td></td>
<td>applications.</td>
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<td>11. 19AEC201</td>
<td>Environmental Studies</td>
<td>1. Master core concepts and methods from ecological and physical sciences</td>
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<td></td>
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<td>and their application in environmental problem solving.</td>
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<td>2. Master core concepts and methods from economic, political, and social</td>
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<td>analysis as they pertain to the design and evaluation of environmental</td>
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<td>policies and institutions.</td>
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<td>3. Appreciate the ethical, cross-cultural, and historical context of</td>
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<td>environmental issues and the links between human and natural systems.</td>
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<td>4. Understand the transnational character of environmental problems and</td>
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<td>ways of addressing them, including interactions across local to global</td>
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<td>scales.</td>
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<td>5. Apply systems concepts and methodologies to analyze and understand</td>
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<td>interactions between social and environmental processes.</td>
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<td>6. Reflect critically about their roles and identities as citizens,</td>
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<td>consumers and environmental actors in a complex, interconnected world.</td>
</tr>
</tbody>
</table>
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners.

| 12. 19ENU301 English – III | 1. Students learnt the basics and purposes of listening skill.  
2. Students will know the importance of speaking.  
3. Students developed the speaking skills on telephone, business and also in travel  
4. Learnt some effective vocabulary learning strategies.  
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.  
6. Students will have honed the skills of communication which is needed for business purpose. |
|-----------------------------|---------------------------------------------------------------|

| 13. 19CCU301 Corporate Accounting | 1. Comprehend and apply the accounting process related corporate accounting  
2. Prepare final accounts for corporate entity.  
3. Understand the accounting standard and apply the same for corporate entity and amalgamation.  
4. Understand the difference of banking balance sheet and non-banking balance sheet  
5. Enhance the problem-solving skills, analytical skills and communication skills in the accounting context.  
6. Develop the knowledge of business and management principles. |
|-------------------------------|----------------------------------------------------------------|

2. Use the Relational model, ER diagrams.  
3. Apply concurrency control and recovery mechanisms for practical problems.  
4. Design the Query Processor and Transaction Processor.  
5. Apply security concepts to databases  
6. Critically formulate a query for analysing the data and communicate in oral and written form. |
|----------------------------------------|------------------------------------------------------------------|

| 15. 19CCU303A Auditing and Corporate Governance | 1. Comprehend on the Concept of auditing, corporate governance and Corporate social responsibility (CSR)  
2. Recall the audit techniques, corporate governance and CSR practices.  
3. Apply lifelong the key learning of best auditing process, Corporate governance and CSR practices  
4. Communicate orally and in written form the auditing concept and techniques, Corporate governance and CSR concepts and practices in business.  
5. Familiar with the standards and laws pertaining to the auditing, Corporate Governance and CSR.  
6. Demonstrate an ability to write and debate about aspects of business ethics and corporate governance. |
|-----------------------------------------------|-------------------------------------------------------------------|

| 16. 19CCU303B Computerised Accounting System | 1. Comprehend on the knowledge of Tally, its features and its importance.  
2. Communicate orally and in written form the Features of Tally in capturing accounting procedures. |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
</table>
| 17. 19CCU311 | Database Management System (Practical)   | 1. Create Table DML command and perform logical operations using the Oracle as IT platform  
2. Design Query using Transaction command  
3. Develop programme using various operations  
4. Design query using character, date and joins function.  
5. To critically analyze the requirement and Write a PL/SQL Programme.  
6. Prepare the written report. |
| 18. 19CCU312A | Auditing and Corporate Governance (practical) | 1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.  
2. Classify and apply vouching, verification and valuation technique to appropriate situation  
3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.  
4. Communicate orally and in written form about the findings and solution.  
5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.  
6. Understand key of expertise such as Internal Audit, Compliance, and Information. |
| 19. 19CCU312B | Computerised Accounting System (practical) | 1. Familiarize on the accounts heads, vouching, inventory valuations, TDS and Pay roll process available in the accounting software  
2. Classify the items under items heads.  
3. Generate the financial Reports, TDS and pay roll reports and evaluate the output.  
4. Communicate the outputs in written form identifying the objective and outcome of each exercise.  
5. To apply the utilization of computerised system as a lifelong learning.  
6. Enables the auditor to perform an audit or track changes that affect the integrity of a transaction. |
| 20. 19ENU401 | English – IV                              | 1. Students have acquired proficiency in communication.  
2. Students have become adept in written communication and presentation skills.  
3. Practice the skill of writing in English and that of public speaking.  
4. Establish and maintain social relationships.  
5. Develop communication skills in business environment.  
6. Refine communication competency through LSRW skills. |
| 21. 19CCU401 | Research Methodology                      | 1. Comprehend the meaning of research, theory of induction, deduction, research process, research |
| 22. 19CCU402 | Cost Accounting | design, sampling techniques, hypothesis writing and report writing  
2. Analyse the research problem and design the blueprint to capture data and analyse the same using appropriate statistical techniques and apply the learning lifelong.  
3. Critically formulate the research design and sampling design suitable for the problem.  
4. Communicate orally and written for the research problem, research design, sampling techniques.  
5. Design a report to communicate the findings and suggestion to make business decision.  
6. Demonstrate the ability to choose methods appropriate to research aims and objectives. |
|---|---|---|
| 23. 19CCU403A | Financial Analysis and Reporting | 1. Understand the cost concepts, types of costing methods and book keeping for cost accounting  
2. Apply tools and techniques to calculate cost and solve the problems.  
3. Select the best methods of costing by critically analysing and apply the same to appropriate situation  
4. Communicate orally and in written the cost concepts  
5. Gain the lifelong learning of cost concepts and apply in the business environment.  
6. Correctly analyze the cost of both the process and operations. |
| 24. 19CCU403B | HTML Programming | 1. Familiarize on the HTML sample documents and its platform and apply the learning for lifelong.  
2. Use the HTML CSS Files Operators, arrays and functions  
3. Understand usage of HTML forms and Create HTML image maps  
4. Critically analyse the need and create the HTML functions required for the situation.  
5. Write the program and present orally and in written form.  
6. Use critical thinking skills to design and create websites. |
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<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</table>
| 25.  | 19CCU411     | Research Methodology (Practical)         | 1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing  
2. Analyse the research problem and design the instruments to capture data, analyse the same using appropriate statistical techniques, and apply the learning lifelong.  
3. Critically evaluate the appropriate scales and measurement to be used for capturing data.  
4. Communicate in written form and prepare report to support decision making.  
5. Work in team and exhibit leadership skills  
6. Provides training in choosing methods materials. |
| 26.  | 19CCU412A    | Financial Analysis and Reporting (Practical) | 1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the elements and users of the financial statements for the decision making.  
2. Understand and apply tools and techniques to analyse the financial statement analysis.  
3. Critically evaluate the results of the tools applied, interpret the result.  
4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.  
5. Utilize the knowledge of financial statement analysis for lifelong.  
| 27.  | 19CCU412B    | HTML Programming (Practical)             | 1. Create HTML document  
2. To format and create links in HTML document  
3. Create Webpage with multiple frames  
4. Use various types of list, images and tags to create HTML Document and apply the learning for lifelong.  
5. Create forms using various input types.  
6. Critically analyse the need and create the HTML functions required for the situation.  
7. Write the program and prepare the report. |
2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.  
3. Analyse few real time cases relevant to company laws  
4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.  
5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.  
6. Learning about raising of capital by companies in compliance with SEBI regulations |
<p>| 29.  | 19CCU501B    | Financial Management                    | 1. Understand the Concept of financial management, objective of financial management, the major four decisions taken by finance manager and its impact and enrich the lifelong learning. |</p>
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<tbody>
<tr>
<td>2.</td>
<td>Analyse the alternatives using appropriate tools and techniques.</td>
<td>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</td>
</tr>
<tr>
<td>3.</td>
<td>Solve the problems and take decisions based on the result.</td>
<td>2. Comprehend on the contemporary issues relevant to accounting concepts.</td>
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<tr>
<td>4.</td>
<td>Communicate orally and in written form the concepts and solutions.</td>
<td>3. Analyse the alternatives using appropriate tools and techniques.</td>
</tr>
<tr>
<td>5.</td>
<td>Analyse cases in a team and exhibit leadership skills.</td>
<td>4. Solve the problems and take decisions based on the result.</td>
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<tr>
<td>6.</td>
<td>Relate capital investment decisions and financial policies to business valuations.</td>
<td>5. Communicate orally and in written form the concepts and solutions.</td>
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<tr>
<th>30.</th>
<th>19CCU502A</th>
<th>Management Accounting</th>
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<tbody>
<tr>
<td>31.</td>
<td>19CCU502B</td>
<td>Advanced Accounting</td>
</tr>
<tr>
<td>32.</td>
<td>19CCU503A</td>
<td>Object Oriented Programming with C++</td>
</tr>
<tr>
<td>33.</td>
<td>19CCU503B</td>
<td>Investment Management</td>
</tr>
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<thead>
<tr>
<th>30.</th>
<th>19CCU502A Management Accounting</th>
<th>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</th>
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</thead>
<tbody>
<tr>
<td>32.</td>
<td>19CCU503A Object Oriented Programming with C++</td>
<td>3. Critically analyse the need and develop the program in OOPS with C++ required for the situation.</td>
</tr>
<tr>
<td>33.</td>
<td>19CCU503B Investment Management</td>
<td>4. Write the program and present orally and in written form.</td>
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6. Help to do standard variation analysis through standard costs. 

6. Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business. 

5. Communicate orally and in written form the concepts and solutions. 

6. Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business. 

5. Communicate orally and in written form the concepts and solutions. 

6. Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business. 

6. Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.

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6. Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.
4. Analyze and evaluate equity securities through examination of economic activity, industry analysis, financial statement analysis and individual firm valuation.

5. Debate issues in efficient markets considering technical analysis and efficient markets and anomalies.

6. Analyze and explain fixed-income and leveraged securities including bond valuation, duration and reinvestment concepts, and convertible securities and warrants.

| 34. 19CCU504A Business Economics | 1. Understand the Concept of micro and macroeconomic factors and its application in business.
2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.
3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.
4. Able to analyse the profitability of the firm, economy of operation, determination of price under various market situations with good grasp on the effect of trade cycles in business.
5. Gain knowledge on Monetary theory, measures by RBI in controlling interest rate and emerging concepts like Bit Coin.

| 35. 19CCU504B Management and Organization Behaviour | 1. Understand the Concept of management, Behaviour as individual, group and organization.
2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.
3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.
4. Evaluate the appropriateness of various leadership styles and conflict management strategies used in organizations.
5. Describe and assess the basic design elements of organizational structure and evaluate their impact on employees.
6. Explain how organizational change and culture affect working relationships within organizations. |

| 36. 19CCU511A Object Oriented Programming with C++ (Practical) | 1. Understand the concept of OOPS with C++, classes, objects, pointers, working with file and apply the learning for lifelong.
2. Develop Program using the Classes, objects and printers.
3. Critically analyse the need and develop the program in OOPS with C++ required for the situation.
4. Write the program and present orally and in written form. |
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|   |   | 5. Be familiar with the application of the Unified Modelling Language (UML) towards analysis and design.  
   |   | 6. Write the simple C++ programs using the variables, operators, control structures, functions and I/O objects 
   | 37. | 19CCU511B | Investment Management (Practical)  
   |   |   | 1. Understand the Concept of investing and mechanics for formulating investment decisions.  
   |   |   | 2. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.  
   |   |   | 3. Apply the investing concepts and skills lifelong.  
   |   |   | 4. Analyze and evaluate equity securities through examination of economic activity, industry analysis financial statement analysis and individual firm valuation.  
   |   |   | 5. Debate issues in efficient markets considering technical analysis and efficient markets and anomalies.  
   |   |   | 6. Analyze and explain fixed-income and leveraged securities including bond valuation, duration and reinvestment concepts, and convertible securities and warrants.  
   |   |   | 19CCU512A | Business Economics (Practical)  
   |   |   | 1. Understand the concept of the micro and macroeconomic concepts and its application in business  
   |   |   | 2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
   |   |   | 3. Critically evaluate the appropriate alternatives and draw a solution.  
   |   |   | 4. Communicate in oral and written form and prepare report  
   |   |   | 5. Work in team and exhibit leadership skills  
   |   |   | 19CCU512B | Management and Organization Behaviour (Practical)  
   |   |   | 1. Understand the concept of the management, behaviour of individual, group and organisation and its application in business  
   |   |   | 2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
   |   |   | 3. Critically evaluate the appropriate alternatives and draw a solution.  
   |   |   | 4. Communicate in oral and written form and prepare report  
   |   |   | 5. Work in team and exhibit leadership skills  
   |   |   | 6. Explain how organizational change and culture affect working relationships within organizations.  
   |   | 19CCU601A | Taxation  
   |   |   | 2. Formulate the Income Tax calculations by critically analysing the assessee’s situation under various income heads and deductions and acquire a Lifelong
| Practice for computation of Tax under various income heads and deductions for any assessee |
|---|---|
| Comprehend on the assessment of the GST |
| Communicate orally and in written form the income tax, GST and customs law and computations of IT. |
| Understand with the laws pertaining to the Income Tax and its apply it lifelong. |
| Understand the basic principles underlying the Indirect Taxation Statutes (with reference to Central Excise Act, Customs Act, Service Tax, Value Added Tax, Central Sales Tax) |

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<tr>
<th>41.</th>
<th>19CCU601B</th>
<th>Internet and Web Designing</th>
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</thead>
<tbody>
<tr>
<td>Understand the concept of internet and World wide web.</td>
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<tr>
<td>Familiarize on the PHP, DHTML, MySQL and JavaScript usage and apply the learning lifelong.</td>
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<tr>
<td>Design the web page using the PHP, DHTML, MySQL and JavaScript</td>
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<td>Critically analyse the requirement and create the webpage required for the situation.</td>
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<td>Write the program and present orally and in written form.</td>
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<tr>
<td>Students will develop and understanding of information design and usability as it applies to interactive media projects.</td>
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<tr>
<th>42.</th>
<th>19CCU602A</th>
<th>Entrepreneurship</th>
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</thead>
<tbody>
<tr>
<td>Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</td>
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</tr>
<tr>
<td>Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</td>
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<tr>
<td>Student will able to understand the importance and role of ethical, sustainability, innovation and global issues for strategic decision making.</td>
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<tr>
<td>Student will able to understand the critical roles of marketing research, competitive analysis, consumer-value proposition, and market-entry strategy in the development of a business plan.</td>
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<tr>
<td>Student will able to describe examples of entrepreneurial business and actual practice, both successful and unsuccessful, and explain the role and significance of entrepreneurship as a career, in the firm, and in society.</td>
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<tr>
<th>43.</th>
<th>19CCU602B</th>
<th>Personal Selling and Salesmanship</th>
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<tbody>
<tr>
<td>Understand the Concept of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</td>
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<tr>
<td>Communicate orally and in written form the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</td>
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<tr>
<td>3.</td>
<td>Apply the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and controlling lifelong practice. Designed to facilitate learning the essentials of salesmanship.</td>
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<tr>
<td>4.</td>
<td>Designed to facilitate learning the essentials of salesmanship.</td>
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<tr>
<td>5.</td>
<td>Aid in developing skills required in planning and executing sales process.</td>
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<tr>
<td>6.</td>
<td>Ensure efficient and effective understanding and performance in all spheres of selling.</td>
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<td>44.</td>
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<td></td>
<td></td>
<td>4. Analyse the strategic issues and strategies required to select and develop manpower resources.</td>
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<td></td>
<td>5. Analyse the strategic issues and strategies required to select and develop manpower resources.</td>
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<td></td>
<td></td>
<td>6. To develop necessary skill set for application of various HR issues.</td>
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<td>45.</td>
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<tr>
<td>19CCU603B</td>
<td>Management Information system</td>
<td>1. Understand the usage of information system in management decision.</td>
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<td></td>
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<td>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision</td>
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<td></td>
<td>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</td>
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<td></td>
<td>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</td>
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<td>5. Apply the understanding of the usage of information system in management decision as a lifelong practice.</td>
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<tr>
<td></td>
<td></td>
<td>6. Understand the various business models being implemented in electronic commerce and how they can be used support organizational strategies.</td>
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<td>46.</td>
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<tr>
<td>19CCU611A</td>
<td>Taxation (Practical)</td>
<td>1. Understand the Concept of direct taxes, indirect taxes and its application.</td>
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<td>2. Know how to e-filing of IT, register GST and apply the GST provisions.</td>
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<td>3. Communicate orally and in written form the direct, indirect taxation concepts and provisions.</td>
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<td>4. Familiarise with the standards and laws pertaining to the Income Tax, GST and customs and apply the knowledge lifelong.</td>
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<td></td>
<td>5. Understand with the laws pertaining to the Income Tax and apply it lifelong.</td>
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</table>
6. Student will able to Understand the basic principles underlying the Indirect Taxation Statutes (with reference to Central Excise Act, Customs Act, Service Tax, Value Added Tax, Central Sales Tax).

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<tr>
<th>Code</th>
<th>Course Name</th>
<th>Description</th>
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</table>
| 47. 19CCU611B | Internet and Web Designing (Practical) | 1. Familiarize on the PHP, DHTML, MySQL and JavaScript usage and apply the learning lifelong  
2. Design a webpage using PHP, DHTML, MySQL and JavaScript  
3. Critically analyse the requirement and create the webpage required for the situation.  
4. Write the program and present orally and in written form.  
5. Write the program and present orally and in written form.  
6. Students will develop an understanding of information design and usability as it applies to interactive media projects. |
| 48. 19CCU612A | Entrepreneurship (Practical) | 1. Understand the concept of the entrepreneurship, idea creation, starting up new ventures, business plan and applying for funding and patent.  
2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.  
4. Communicate in oral and written form and prepare business plan and the report.  
5. Work in team and exhibit leadership skills.  
6. Describe examples of entrepreneurial business and actual practice, both successful and unsuccessful, and explain the role and significance of entrepreneurship as a career, in the firm, and in society. |
| 49. 19CCU612B | Personal Selling and Salesmanship (Practical) | 1. Understand the concept of the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.  
2. Analyse the case studies, understand the selling process and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills  
6. Designed to facilitate learning the essentials of salesmanship. |
| 50. 19CCU613A | Human Resource Management (Practical) | 1. Understand the concept of the Human resource management and HR practices in real organization.  
2. Analyse the case studies, HR process and apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives methods for HR practices and select the best methods suiting the situation.  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills |
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<tr>
<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Learning Outcomes</th>
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<tbody>
<tr>
<td>51.</td>
<td>19CCU613B</td>
<td>Management Information system (Practical)</td>
<td>6. To develop necessary skill set for application of various HR issues. 1. Understand the usage of information system in management decision. 2. Critically analyse and evaluate the use of DSS, AI in supporting management decision 3. Communicate orally and in written form the understanding of the usage of information system in management decision. 4. Understand the security and ethical issues pertaining to use of information technology in management decision making. 5. Apply the understanding of the usage of information system in management decision lifelong practice. 6. Understand the various business models being implemented in electronic commerce and how they can be used support organizational strategies.</td>
</tr>
<tr>
<td>52.</td>
<td>19CCU691</td>
<td>Project</td>
<td>1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection. 2. Understand the application of Research process in the area of accounting / Finance / Marketing / HR / International business etc. 3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified. 4. Apply the theoretical and practical learning of doing research into lifelong practice. 5. Communicate in oral and written form and prepare report 6. Work in team and exhibit leadership skills 7. Utilize the IT application for analysis and preparation of report.</td>
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<td>Sl. No.</td>
<td>Course Code</td>
<td>Name of the Course</td>
<td>Course Outcomes</td>
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<tr>
<td>1.</td>
<td>19LAU101</td>
<td>Language - I</td>
<td>1. Complete introduction to ‘History of Tamil Literature’, which is an optional subject in competitive examinations such as Indian Citizenship.</td>
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<td>2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.</td>
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<td>3. ‘Scientific Tamil’, the field of development of Tamil; Development of multi-pronged research thinking on ‘Internet Tamil’.</td>
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<td>4. Having creative self-improvement and creativity development for employment.</td>
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<td>5. An attitude of seeking literature in support of social and biological values.</td>
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<tr>
<td>2.</td>
<td>19ENU101</td>
<td>English – I</td>
<td>1. Retrieve fundamentals of English language to construct error free sentences.</td>
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<td>2. Develop the knowledge of interpersonal skills.</td>
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<td>3. Establish and maintain social relationships.</td>
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<td>4. Develop communication skills in business environment.</td>
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<td>5. Refine communication competency through LSRW skills.</td>
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<td>6. Improving intrapersonal skills through literary works.</td>
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<td>3.</td>
<td>19BPU101</td>
<td>Financial Accounting</td>
<td>1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.</td>
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<td>2. To know about the accounting process and preparation of final accounts.</td>
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<td>3. To learn and apply the inventory valuation.</td>
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<td>4. To understand and apply the techniques for preparing accounts in different business organizations like consignment, joint venture and Non – trading concern.</td>
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<td>5. To know the accounting procedure for branches and also to ascertain the financial position of each branch separately.</td>
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<td>6. To learn and apply the accounting procedures for partnership firm.</td>
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<tr>
<td>4.</td>
<td>19BPU102</td>
<td>Management and Organization Behaviour</td>
<td>1. Understand the Concept of management, Behaviour as individual, group and organization.</td>
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<td>2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.</td>
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<td>3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.</td>
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<td>4. Apply the Organizational behaviour and personality</td>
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<td>5. Describe the leadership theories</td>
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<td>6. Apply the concept of team work, Conflicts and Organizational Change.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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| 19AEC101    | Business Communication                           | 1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.  
2. Draft business correspondence for the organization requirement.  
3. Prepare business reports for organization needs.  
4. Use appropriate technology for business communication.  
5. Draft the resume and to develop skills to face the interview  
6. Improved the communication skill of students |
| 19BPU111    | Management and Organization Behaviour (Practical) | 1. Understand the concept of the management, behaviour of individual, group and organisation and its application in business  
2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives and draw a solution.  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills  
6. Gained insight about the team work |
| 19LAU201    | Language – II                                    | 1. Complete introduction to ‘History of Tamil Literature’, which is an optional subject in competitive examinations such as Indian Citizenship.  
2. Access to literature with a research-oriented approach to inscriptive, manuscript, and archaeological research.  
3. ‘Scientific Tamil’, the field of development of Tamil; Development of multi-pronged research thinking on ‘Internet Tamil’.  
4. Having creative self-improvement and creativity development for employment.  
5. An attitude of seeking literature in support of social and biological values.  
| 19ENU201    | English – II                                     | 1. Strengthen the foundation of the language to elevate the command of standard grammar.  
2. Inculcate the proper communication strategy.  
3. Formulate and communicate persuasive arguments for specific business outcome.  
4. Apply fundamentals of language for reading, writing and effective communication.  
5. Standardize and demonstrate understanding of LSRW skills.  
6. Introduce literature to enhance the moral and aesthetic values. |
| 19BPU201    | Business Process Services in Finance and Accounting | 1. Understand the finance and accounting concept and the need to outsource finance and accounting activities  
2. Comprehend the standards pertaining to the accounting, compliances like SOX and internal audit framework like COSO.  
3. Understand the mechanics of purchase, inventory control, accounts payables-receivables and General ledger in the F & A Technology. |
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<td><strong>4.</strong> Communicate orally and in written form the mechanics of purchase, inventory control, accounts payables-receivables and General ledger in the F &amp; A Technology.</td>
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<td><strong>5.</strong> Gain a lifelong learning for applying the F&amp;A Technology in BPS business.</td>
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<td><strong>6.</strong> Acquire knowledge about the GAAP in different countries</td>
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<td><strong>10.</strong></td>
<td>19BPU202</td>
<td>Business Analytics</td>
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<td><strong>1.</strong> Utilize the concept of matrices, differential calculus to solve business problems</td>
<td><strong>2.</strong> Calculate and apply the measure of central tendency and dispersion in decision making.</td>
<td><strong>3.</strong> Evaluate the relationship and association between variables to formulate the strategy in business.</td>
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<td><strong>4.</strong> Apply the concept of index numbers and trend analysis in business decisions.</td>
<td><strong>5.</strong> Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.</td>
<td><strong>6.</strong> Acquire knowledge about the sampling estimation</td>
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<td><strong>11.</strong></td>
<td>19AEC201</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td><strong>1.</strong> Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</td>
<td><strong>2.</strong> Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.</td>
<td><strong>3.</strong> Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</td>
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<td><strong>4.</strong> Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</td>
<td><strong>5.</strong> Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</td>
<td><strong>6.</strong> Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</td>
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<td><strong>7.</strong> Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners.</td>
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<td><strong>12.</strong></td>
<td>19BPU211</td>
<td>Business Process Services in Finance and Accounting (Practical)</td>
</tr>
<tr>
<td><strong>1.</strong> Understand the finance and accounting concept and the need to outsource finance and accounting activities</td>
<td><strong>2.</strong> Comprehend the standards pertaining to the accounting, compliances like SOX and internal audit framework like COSO.</td>
<td><strong>3.</strong> Understand the mechanics of purchase, inventory control, accounts payables-receivables and General ledger in the F &amp; A Technology.</td>
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<tr>
<td><strong>4.</strong> Communicate orally and in written form the mechanics of purchase, inventory control, and General ledger in the F &amp; A Technology.</td>
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<td>Course Code</td>
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<td>Learning Outcomes</td>
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<tr>
<td>5.</td>
<td>Gain a lifelong learning for applying the F&amp;A Technology in BPS business.</td>
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<tr>
<td>6.</td>
<td>Communicate orally and in written form the mechanics of accounts payables-receivables in the F &amp; A Technology.</td>
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</table>
| 13. 19BPU212 | Computer Applications for Business (Practical) | 1. Prepare documents and reports for the organization.  
2. Prepare datasheet and apply the built-in functions for analyzing the data to support decision making.  
3. Utilize visual aids and tools to present the data  
4. Design the presentations for the business meetings  
5. Store, retrieve data and make decisions based on the information.  
6. Exhibit the communication skills to convey the outputs produced. |
3. Familiar with the Supply Chain Phases and Technology Intervention  
4. Obtain the knowledge on Requirement and Master Data Management  
5. Enrich with the Logistics Fleet, Warehouse and Inventory Management  
6. Acquire knowledge about the inventory management |
3. Formulate the Income Tax calculations by critically analyzing the assessee’s situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessed  
4. Communicate orally and in written the Income tax computation under various income heads and deductions.  
5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.  
6. Compute business and gain from business and profession |
| 16. 19BPU303 | Cost and Management Accounting | 1. Students will have the knowledge about cost accounting and book keeping system.  
2. Students will be capable of calculating wages and ascertaining overhead cost.  
3. Students will have expertise in analyzing and interpreting financial statement.  
4. Students will be capable of preparing cash flow and fund flow statements.  
5. Students will have the understanding above marginal costing and budgeting.  
6. Describe the preparation of cost sheet |
| 17. 19BPU304A | Principles of Auditing | 1. Comprehend on the Concept of auditing.  
2. Recall the audit techniques and practices.  
3. Apply lifelong the key learning of best auditing process. |
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<th>Course Details</th>
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</table>
5. Familiar with the standards and laws pertaining to the auditing.  
6. Learn the preparation of audit report.  
1. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.  
2. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.  
3. Communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning.  
4. Apply the learning of the insurance procedures, products, services and operations lifelong.  
5. Comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk.  
6. Acquire knowledge about the Life Insurance and Annuity. |
| 19. 19BPU311A | Principles of Auditing (Practical) | 1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.  
2. Classify and apply vouching, verification and valuation technique to appropriate situation  
3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.  
4. Communicate orally and in written form about the findings and solution.  
5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.  
6. Analyze the provisions amended to the appoint of auditor and audit in Companies Act.  
1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.  
2. Classify and apply vouching, verification and valuation technique to appropriate situation  
3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.  
4. Communicate orally and in written form about the findings and solution.  
5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.  
6. Analyze the provisions amended to the appoint of auditor and audit in Companies Act. |
| 20. 19BPU311B | Business Process Services in Insurance (Practical) | 1. Understand the concept, products, services, regulatory body and laws pertaining to insurance.  
2. Analyse the features of the insurance and apply the theoretical learning into lifelong practice of BPS industry.  
3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.  
4. Comprehend and apply the laws related to insurance.  
5. Communicate in oral and written form and prepare report  
6. Work in teams and exhibit leadership skills  
1. Understand the concept, products, services, regulatory body and laws pertaining to insurance.  
2. Analyse the features of the insurance and apply the theoretical learning into lifelong practice of BPS industry.  
3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.  
4. Comprehend and apply the laws related to insurance.  
5. Communicate in oral and written form and prepare report  
6. Work in teams and exhibit leadership skills |
2. Comprehend and compute GST liabilities.  
3. Know the procedure to register GST and apply GST provisions to business situations.  
4. Communicate orally and in written form the indirect taxations concepts and provisions.  
1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.  
2. Comprehend and compute GST liabilities.  
3. Know the procedure to register GST and apply GST provisions to business situations.  
4. Communicate orally and in written form the indirect taxations concepts and provisions. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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</thead>
<tbody>
<tr>
<td>5.</td>
<td></td>
<td>Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application. Understand the concept of time, value and place taxable supply.</td>
</tr>
<tr>
<td>22. 19BPU402</td>
<td>Campus to Corporate Transition</td>
<td>1. Understand the corporate and BPS industry growth in India. 2. Comprehend on the requirement of the industry like attitude, language, behaviour, body language, learning style etc. 3. Train the student on corporate etiquettes, professional skills, English language. 4. Equip the students to draft resume, face the Group discussion and interview. 5. Communicate efficiently in oral and in written form as expected by the BPS industry. 6. Acquire knowledge about the difference between campus and corporate.</td>
</tr>
<tr>
<td>23. 19BPU403</td>
<td>Retail CPG and Market Research</td>
<td>1. Understand the concept of marketing research, consumer goods, retailing and media research and its application in BPS industry. 2. Analyse the classification of FMCG industry, Retail formats and media research options and apply the learning lifelong. 3. Critically formulate the research design for media research and retail research and understand ways to evaluate the best alternative. 4. Communicate orally and written form the concept of marketing research, consumer goods, retailing and media research and its application in BPS industry. 5. Design a report to communicate the findings and suggestion to make business decision. 6. Acquire knowledge about the media research.</td>
</tr>
<tr>
<td>24. 19BPU404A</td>
<td>Financial Analysis and Reporting</td>
<td>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the elements and users of the financial statements for the decision making. 2. Understand and apply tools and techniques to analyse the financial statement analysis. 3. Critically evaluate the results of the tools applied, interpret the result. 4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results. 5. Utilize the knowledge of financial statement analysis for lifelong. 6. Understand the financial position of the firms.</td>
</tr>
<tr>
<td>25. 19BPU404B</td>
<td>Business Process Services in Banking</td>
<td>1. Understand the Concept of banking operations, functions, risk associated with and law pertaining to banking functions. 2. Comprehend on the banking system, its regulatory body related to banks that facilitates the BPS process. 3. Communicate orally and in written form the understanding of banking operations, functions, risk associated with and law pertaining to banking functions.</td>
</tr>
</tbody>
</table>
| 26. 19BPU411A | Financial Analysis and Reporting (Practical) | 4. Apply the learning of the bank functions and operations lifelong practice in BPS.  
5. Acquire knowledge about the basics of cards  
6. Gain understanding about the bank procedures in International Trade |
|--------------|--------------------------------------------|-----------------------------------------------------------------------------------|
|              |                                           | 1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the elements and users of the financial statements for the decision making.  
2. Understand and apply tools and techniques to analyse the financial statement analysis.  
3. Critically evaluate the results of the tools applied, interpret the result.  
4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.  
5. Utilize the knowledge of financial statement analysis for lifelong.  
6. Understand the financial position of the firms |
| 27. 19BPU411B | Business Process Services in Banking (Practical) | 1. Understand the concept, products, services, regulatory body and laws pertaining to banking Practice and its application in BPS.  
2. Analyse the features of the banking apply the theoretical learning into lifelong practice in BPS sector.  
3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.  
4. Comprehend and apply the laws related to banking.  
5. Communicate in oral and written form and prepare report  
6. Work in teams and exhibit leadership skills |
| 28. 19BPU501A | Services Marketing | 1. Understand the Concept of Services marketing, and 6Ps of Services Marketing  
2. Communicate orally and in written form the concepts of Services marketing and 6 Ps of Services marketing  
3. Apply the Services marketing concepts and skills lifelong.  
4. Acquire knowledge about the importance of service delivery  
5. understand the service strategies for health and education  
6. Understand the service strategy for hospitality, tourism, Transportation, Information Technology |
| 29. 19BPU501B | Business Process Services in Capital Market | 1. Understand the Concept of capital markets in domestic and global scenario, the securities traded, Investment management, private equity, mutual fund and hedge funds and its application.  
2. Calculate the NAV and analyse the performance of mutual fund scheme  
3. Apply the hedge fund strategies and fund accounting principles along with theoretical knowledge of capital market in BPS operations.  
4. Communicate orally and in written form the understanding of capital markets in domestic and global scenario, the securities traded, Investment management,
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>19BPU502A</td>
<td>Business Law</td>
<td>1. Identify the basic legal principles behind contractual agreements.</td>
</tr>
<tr>
<td>19BPU502B</td>
<td>Managing Business</td>
<td>1. Understand the Concept of business process, its need in India.</td>
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<tr>
<td></td>
<td>Processes - I</td>
<td>2. Evaluate the BPS business and operation using metrics.</td>
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<tr>
<td>19BPU503A</td>
<td>Marketing Management</td>
<td>1. Understand the Concept of marketing, and 4Ps of Marketing</td>
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<tr>
<td>19BPU503B</td>
<td>Research Methodology</td>
<td>1. Comprehend the meaning of research, theory of induction, deduction,</td>
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<td>research process, research design, sampling techniques, hypothesis writing</td>
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<td></td>
<td></td>
<td>and report writing</td>
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<tr>
<td>19BPU504A</td>
<td>Business Economics</td>
<td>1. Understand the Concept of micro and macroeconomic factors and its</td>
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<td>application in business.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<tr>
<td>19BPU504B</td>
<td>Management Information System</td>
<td>1. Understand the usage of information system in management decision.</td>
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<td>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision.</td>
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<td>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</td>
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<td>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</td>
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<td>5. Apply the understanding of the usage of information system in management decisions a lifelong practice.</td>
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<td></td>
<td>6. To acquire knowledge about the Strategic Management Information System.</td>
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<tr>
<td>19BPU511A</td>
<td>Marketing Management (Practical)</td>
<td>1. Understand the concept of the marketing, 4-s of marketing and its application in real business situation,</td>
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<td></td>
<td></td>
<td>2. Analyse the business case studies and try to apply the theoretical learning into lifelong practice.</td>
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<td></td>
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<td>3. Critically evaluate the appropriate alternatives and draw a solution.</td>
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<td>4. Communicate in oral and written form and prepare report.</td>
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<td></td>
<td>5. Work in team and exhibit leadership skills</td>
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<td>6. Gain knowledge about the brands and brand strategy of the firms</td>
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<tr>
<td>19BPU511B</td>
<td>SPSS (Practical)</td>
<td>1. Create datasheet and enter the data</td>
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<tr>
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<td>2. Compute descriptive statistics using the package and graphically represent the data.</td>
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<td>3. Perform univariate and bivariate analysis in the software package.</td>
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<td></td>
<td></td>
<td>4. Perform multivariate analysis in the software package.</td>
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<td>5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.</td>
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<td>6. Acquire knowledge about the parametric and non-parametric test</td>
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<tr>
<td>19BPU601A</td>
<td>Human Resource Management</td>
<td>1. Students will be familiarized with basic concept of HRM.</td>
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<td>2. Students will be capable of acquiring human resource.</td>
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<td>3. Students will be capable of organizing and conducting training and development programmes.</td>
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<td>4. Students will have the sound knowledge of performance of appraisal system.</td>
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<td>5. Students will be capable of handling grievances of employees and industrial disputes.</td>
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<td>6. Learn about the Industrial disputed and maintenance</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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</table>
2. Comprehend and utilize the tools and techniques to reduce the defect.  
3. Gain knowledge of problem-solving techniques and apply the same in BPS sector.  
4. Understand the Lean and six sigma concept and its application in managing the business processes.  
5. Communicate orally and in written form the understanding of managing the business process using various techniques.  
6. Learn about the transaction monitoring process. |
| 40. 19BPU602A | Company Law              | 1. Understand the Concept of laws related to constitution of company, finance structure, management team.  
2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.  
3. Analyse few real time cases relevant to company laws.  
4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.  
5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.  
6. Apply the knowledge about the company directors. |
| 41. 19BPU602B | Financial Management     | 1. Students will be familiarized with basic concepts of financial management.  
2. Students will know the technicalities of making investment decisions.  
3. Students will be capable of making financing decisions.  
4. Students will be familiarized with concepts of dividend decisions.  
5. Students will be capable of making working capitalization and cash management.  
6. Learn about the capital structure theories. |
| 42. 19BPU603A | Entrepreneurship         | 1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.  
2. Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.  
3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.  
4. Acquire knowledge about the types of business entities.  
5. Gain insight about the sources of business ideas and feasibility studies.  
6. Demonstrate mobilizing resources for start-ups. |
| 43. 19BPU603B | Excel for Business       | 1. Understand the features of Spreadsheet applications and functions.  
2. Comprehend and apply computer tools and inbuilt functions on raw data.  
3. Communicate orally and in written form the features of spreadsheet applications and functions.  
4. Utilize the expertise of the Excel features and functions as a lifelong practice. |
<table>
<thead>
<tr>
<th>44.</th>
<th>19BPU611A</th>
<th>Entrepreneurship (Practical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Acquire knowledge about data analysis</td>
<td></td>
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<tr>
<td>6.</td>
<td>Gain insight about the advanced function in MS EXCEL and PIVOT TABLE</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>2.</td>
<td>Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>3.</td>
<td>Apply the understanding of entrepreneurship, types of entrepreneurs,</td>
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<tr>
<td>4.</td>
<td>Acquire knowledge about the entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</td>
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<tr>
<td>5.</td>
<td>Learn about the sources of business ideas and feasibility studies</td>
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<tr>
<td>6.</td>
<td>Gain insight about the IPR, Patent and Copyright</td>
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<thead>
<tr>
<th>45.</th>
<th>19BPU611B</th>
<th>Excel for Business (Practical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Create and format the data in excel sheet</td>
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<tr>
<td>2.</td>
<td>Utilize all the inbuilt, functions and formulas and analyses the data.</td>
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<tr>
<td>3.</td>
<td>Critically analyze the data using the what-if, solver and pivot functions.</td>
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<td>4.</td>
<td>Communicate the outputs in written form identifying the objective and outcome of each exercise.</td>
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<tr>
<td>5.</td>
<td>Apply the practice of utilization of spreadsheets lifelong learning for data analysis and decision making.</td>
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<tr>
<td>6.</td>
<td>Understand the application of PIVOT Table</td>
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<tr>
<th>46.</th>
<th>19BPU691</th>
<th>Project</th>
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<tbody>
<tr>
<td>1.</td>
<td>Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.</td>
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<tr>
<td>2.</td>
<td>Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</td>
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<td>3.</td>
<td>Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</td>
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<tr>
<td>4.</td>
<td>Apply the theoretical and practical learning of doing research into lifelong practice.</td>
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<tr>
<td>5.</td>
<td>Communicate in oral and written form and prepare report</td>
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<tr>
<td>6.</td>
<td>Work in team and exhibit leadership skills</td>
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<td>7.</td>
<td>Utilise the IT application for analysis and preparation of report</td>
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<tr>
<td>Sl. No.</td>
<td>Course Code</td>
<td>Name of the Course</td>
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</table>
| 1.     | 19LAU101    | Language - I       | 1. Complete introduction to ‘History of Tamil Literature’, which is an optional subject in competitive examinations such as Indian Citizenship.  
2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.  
3. ‘Scientific Tamil’, the field of development of Tamil; Development of multi-pronged research thinking on ‘Internet Tamil’.  
4. Having creative self-improvement and creativity development for employment.  
5. An attitude of seeking literature in support of social and biological values.  
2. Develop the knowledge of interpersonal skills.  
3. Establish and maintain social relationships.  
4. Develop communication skills in business environment.  
5. Refine communication competency through LSRW skills.  
6. Improving intrapersonal skills through literary works. |
| 3.     | 19PAU101    | Financial Accounting | 1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.  
2. To know about the accounting process and preparation of final accounts  
3. To learn and apply the inventory valuation.  
4. To understand and apply the techniques for preparing accounts in different business organizations like consignment, joint venture and Non – trading concern.  
5. To know the accounting procedure for branches and also to ascertain the financial position of each branch separately.  
6. To learn and apply the accounting procedures for partnership firm. |
| 4.     | 19PAU102    | Business Law       | 1. Identify the basic legal principles behind contractual agreements.  
2. Understand the relevance of business law in economic and social context.  
3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.  
4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time. |
<table>
<thead>
<tr>
<th>5.</th>
<th>19AEC101</th>
<th>Business Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.</td>
<td>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</td>
</tr>
<tr>
<td>6.</td>
<td>19LAU201</td>
<td>Language – II</td>
</tr>
<tr>
<td>6.</td>
<td>Improved the communication skill of students</td>
<td>1. Complete introduction to ‘History of Tamil Literature’, which is an optional subject in competitive examinations such as Indian Citizenship.</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.</td>
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<td>7.</td>
<td>19ENU201</td>
<td>English – II</td>
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<tr>
<td>7.</td>
<td></td>
<td>3. ‘Scientific Tamil’, the field of development of Tamil; Development of multi-pronged research thinking on ‘Internet Tamil’.</td>
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<tr>
<td>7.</td>
<td></td>
<td>4. Having creative self-improvement and creativity development for employment.</td>
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<tr>
<td>7.</td>
<td></td>
<td>5. An attitude of seeking literature in support of social and biological values.</td>
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<td>8.</td>
<td>19PAU201</td>
<td>Corporate Accounting</td>
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<tr>
<td>8.</td>
<td></td>
<td>1. Comprehend and apply the accounting process related corporate accounting</td>
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<td>8.</td>
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<td>2. Prepare final accounts for corporate entity.</td>
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<td>8.</td>
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<td>3. Understand the accounting standard and apply the same for corporate entity and amalgamation.</td>
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<td>8.</td>
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<td>4. Understand the difference of banking balance sheet and non-banking balance sheet</td>
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<td>8.</td>
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<td>5. Enhance the problem-solving skills and analytical skills in the accounting context.</td>
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<tr>
<td>8.</td>
<td></td>
<td>6. Enhance the problem-solving skills and analytical skills in the accounting context.</td>
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<tr>
<td>9.</td>
<td>19PAU202</td>
<td>Business Mathematics and Statistics</td>
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<tr>
<td>9.</td>
<td></td>
<td>1. Utilize the concept of matrices, differential calculus to solve business problems</td>
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<td>9.</td>
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<td>2. Calculate and apply the measure of central tendency and dispersion in decision making.</td>
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</tbody>
</table>
| 10.  | 19AEC201 Environmental Studies | 3. Evaluate the relationship and association between variables to formulate the strategy in business.  
4. Apply the concept of index numbers and trend analysis in business decisions.  
5. Demonstrate capabilities as problem-solving and critical thinking  
6. Communication skills related to the discipline of statistics.  
1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.  
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and practitioners. |
| 11.  | 19ENU301 English – III | 1. Students learnt the basics and purposes of listening skill.  
2. Students will know the importance of speaking.  
3. Students developed the speaking skills on telephone, business and also in travel  
4. Learnt some effective vocabulary learning strategies.  
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.  
6. Students will have honed the skills of communication which is needed for business purpose. |
| 12.  | 19PAU301 Cost Accounting | 1. Understand the cost concepts, types of costing methods and book keeping for cost accounting  
2. Apply tools and techniques to calculate cost and solve the problems.  
3. Select the best methods of costing by critically analyzing and apply the same to appropriate situation  
4. Communicate orally and in written the cost concepts  
5. Gain the lifelong learning of cost concepts and apply in the business environment.  
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<tbody>
<tr>
<td><strong>3.</strong></td>
<td>Formulate the Income Tax calculations by critically analyzing the assessee’s situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee.</td>
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<tr>
<td><strong>4.</strong></td>
<td>Communicate orally and in written the Income tax computation under various income heads and deductions.</td>
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<tr>
<td><strong>5.</strong></td>
<td>Familiar with the laws pertaining to the Income Tax and it apply it lifelong.</td>
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<td><strong>6.</strong></td>
<td>Prepare a statement of income for a person.</td>
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<td><strong>14.</strong></td>
<td>19PAU303A</td>
<td>Auditing and Corporate Governance</td>
</tr>
<tr>
<td><strong>1.</strong></td>
<td>Comprehend on the Concept of auditing, corporate governance and Corporate social responsibility (CSR)</td>
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<tr>
<td><strong>2.</strong></td>
<td>Recall the audit techniques, corporate governance and CSR practices.</td>
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<td><strong>3.</strong></td>
<td>Apply lifelong the key learning of best auditing process, Corporate governance and CSR practices</td>
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<tr>
<td><strong>4.</strong></td>
<td>Communicate orally and in written form the auditing concept and techniques, Corporate governance and CSR concepts and practices in business.</td>
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<tr>
<td><strong>5.</strong></td>
<td>Familiar with the standards and laws pertaining to the auditing, Corporate Governance and CSR.</td>
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<td><strong>6.</strong></td>
<td>Reminiscence with statistics on global reporting.</td>
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<td><strong>15.</strong></td>
<td>19PAU303B</td>
<td>Computerised Accounting System</td>
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<tr>
<td><strong>1.</strong></td>
<td>Comprehend on the knowledge of Tally, its features and its importance.</td>
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<tr>
<td><strong>2.</strong></td>
<td>Communicate orally and in written form the Features of Tally in capturing accounting procedures.</td>
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<td><strong>3.</strong></td>
<td>Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.</td>
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<td><strong>4.</strong></td>
<td>Familiarize on the incorporation of GST standards into accounting and computerised accounting process.</td>
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<tr>
<td><strong>5.</strong></td>
<td>Integrate accounting concepts and computer for effective decision making.</td>
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<tr>
<td><strong>6.</strong></td>
<td>Practical application of tally concepts in organizations.</td>
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<tr>
<td><strong>16.</strong></td>
<td>19PAU311A</td>
<td>Auditing and Corporate Governance (Practical)</td>
</tr>
<tr>
<td><strong>1.</strong></td>
<td>Comprehend and Analyse the Auditing standards and standards for the audit evidence.</td>
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<tr>
<td><strong>2.</strong></td>
<td>Classify and apply vouching, verification and valuation technique to appropriate situation</td>
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<tr>
<td><strong>3.</strong></td>
<td>Analyse and critically evaluate the case study and justify or prescribe a solution suitable.</td>
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<tr>
<td><strong>4.</strong></td>
<td>Communicate orally and in written form about the findings and solution.</td>
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<tr>
<td><strong>5.</strong></td>
<td>Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.</td>
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<tr>
<td><strong>6.</strong></td>
<td>Reminiscence with statistics on global reporting.</td>
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</tbody>
</table>
| 17. | 19PAU311B | Computerised Accounting System (practical) | 1. Familiarize on the accounts heads, vouching, inventory valuations, TDS and Pay roll process available in the accounting software  
2. Classify the items under items heads  
3. Generate the financial Reports, TDS and pay roll reports and evaluate the output.  
4. Communicate the outputs in written form identifying the objective and outcome of each exercise.  
5. To apply the utilization of computerised system as a lifelong learning.  
6. Practical application of tally concepts in organizations. |
| --- | --- | --- | --- |
| 18. | 19ENU401 | English – IV | 1. Students have acquired proficiency in communication.  
2. Students have become adept in written communication and presentation skills.  
3. Practice the skill of writing in English and that of public speaking.  
4. Establish and maintain social relationships.  
5. Develop communication skills in business environment.  
6. Refine communication competency through LSRW skills. |
| 19. | 19PAU401 | Research Methodology | 1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing  
2. Analyse the research problem and design the blue print to capture data and analyse the same using appropriate statistical techniques and apply the learning lifelong.  
3. Critically formulate the research design and sampling design suitable for the problem.  
4. Communicate orally and written for the research problem, research design, sampling techniques.  
5. Design a report to communicate the findings and suggestion to make business decision  
6. Provide suggestion to make business decision |
2. Comprehend and compute GST liabilities.  
3. Know the procedure to register GST and apply GST provisions to business situations.  
4. Communicate orally and in written form the indirect taxations concepts and provisions.  
5. Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application.  
2. Understand and apply tools and techniques to analyse the financial statement analysis.  
3. Critically evaluate the results of the tools applied, interpret the result. |
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>19PAU403B</td>
<td>Excel for Business</td>
<td>1. Understand the features of Spreadsheet applications and functions.</td>
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<td>2. Comprehend and apply computer tools and inbuilt functions on raw data.</td>
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<td>3. Communicate orally and in written form the features of spreadsheet applications and functions.</td>
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<td>4. Utilize the expertise of the Excel features and functions as a lifelong practice.</td>
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<td></td>
<td>5. Utilize the expertise of the Excel features and functions as a lifelong practice.</td>
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<td>6. Use shortcut methods in spreadsheet</td>
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<tr>
<td>19PAU411</td>
<td>Research Methodology (Practical)</td>
<td>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing.</td>
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<tr>
<td></td>
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<td>2. Analyse the research problem and design the instruments to capture data, analyse the same using appropriate statistical techniques, and apply the learning lifelong.</td>
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<td>3. Critically evaluate the appropriate scales and measurement to be used for capturing data.</td>
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<td>4. Communicate in written form and prepare report to support decision making.</td>
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<td>5. Work in team and exhibit leadership skills.</td>
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<td>6. Problem solving and make better decisions.</td>
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<tr>
<td>19PAU412</td>
<td>Indirect Taxation (Practical)</td>
<td>1. Comprehend on the Concept of indirect taxes emphasizing GST/CGST/IGST/SGST/UTGST and customs law.</td>
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<td>2. Know the procedure to register GST and apply GST provisions to business situations.</td>
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<td>3. Communicate orally and in written form the indirect taxations concepts and provisions.</td>
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<td>4. Familiar with the standards and laws pertaining GST and customs and apply the knowledge lifelong.</td>
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<td>5. Application of GST provisions for business concerns.</td>
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<td>6. Comprehend and compute GST liabilities.</td>
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<tr>
<td>19PAU501A</td>
<td>Company Law</td>
<td>1. Understand the Concept of laws related to constitution of company, finance structure, management team.</td>
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<td>2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.</td>
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<td>3. Analyse few real time cases relevant to company laws</td>
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<td>4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.</td>
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<td>5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.</td>
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<td>6. Online registration and online filing process of documents.</td>
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<td>19PAU501B</td>
<td>Financial Management</td>
<td>1. Understand the Concept of financial management, objective of financial management, the major four</td>
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<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>PAU502A</td>
<td>Management Accounting</td>
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<tr>
<td>PAU502B</td>
<td>Advanced Accounting</td>
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<tr>
<td>PAU503A</td>
<td>Marketing Management</td>
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<tr>
<td>PAU503B</td>
<td>Investment Management</td>
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</tbody>
</table>

1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. Analyse the alternatives using appropriate tools and techniques.
3. Solve the problems and take decisions based on the result.
4. Communicate orally and in written form the concepts and solutions.
5. Analyse cases in a team and exhibit leadership skills.
6. Plan and Manage the cash flows in companies.

27. **Management Accounting**
   - Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
   - Analyse the alternatives using appropriate tools and techniques.
   - Solve the problems and take decisions based on the result.
   - Communicate orally and in written form the concepts and solutions.
   - Analyse cases in a team and exhibit leadership skills.
   - Plan and Manage the cash flows in companies.

28. **Advanced Accounting**
   - Understand the accounting for advanced issues in partnership, BFSI sector and special transaction.
   - Comprehend on the working of accounting standards.
   - Solve the problems and take decisions based on the result.
   - Understand the accounting for advanced corporate issues that could be applied lifelong.
   - Communicate orally and in written form the concepts and solutions.
   - Acquire knowledge on accounting procedure for branches and also to ascertain the financial position of each branch separately.

29. **Marketing Management**
   - Understand the Concept of marketing, and 4Ps of Marketing.
   - Communicate orally and in written form the concepts of marketing and 4Ps of marketing.
   - Apply the marketing concepts and skills lifelong.
   - Analyse the business case studies and try to apply the theoretical learning into lifelong practice.
   - Critically evaluate the appropriate alternatives and draw a solution.
   - Work in team and exhibit leadership skills.

30. **Investment Management**
   - Understand the Concept of investing and mechanics for formulating investment decisions.
   - Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
   - Apply the investing concepts and skills lifelong.
   - Analyse the EIC framework make decisions based on investing in different avenues.
   - Critically evaluate the risk return parameters and select the best alternative.
<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Description</th>
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</thead>
</table>
2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.  
3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.  
4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
5. Critically evaluate the appropriate alternatives and draw a solution.  
6. Work in team and exhibit leadership skills |
| 32. 19PAU504B | Management and Organization Behaviour | 1. Understand the Concept of management, Behaviour as individual, group and organization.  
2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.  
3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.  
4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
5. Critically evaluate the appropriate alternatives and draw a solution.  
6. Work in team and exhibit leadership skills |
| 33. 19PAU511A | Marketing Management (Practical) | 1. Understand the concept of the marketing, 4-s of marketing and its application in real business situation,  
2. Analyse the business case studies and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives and draw a solution.  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills  
6. Apply the marketing concepts and skills lifelong |
| 34. 19PAU511B | Investment Management (Practical) | 1. Understand the concept of the Investment Management and its application in real business situation,  
2. Analyse the business case studies and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives and draw a solution.  
4. Communicate in written form and prepare report  
5. Apply the investing concepts and skills lifelong.  
6. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions |
| 35. 19PAU512A | Business Economics (Practical) | 1. Understand the concept of the micro and macroeconomic concepts and its application in business  
2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives and draw a solution.  
4. Communicate in oral and written form and prepare report |
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 36. 19PAU512B | Management and Organization Behaviour (Practical) | 1. Understand the concept of the management, behaviour of individual, group and organisation and its application in business  
2. Analyse the case studies and try to apply the theoretical learning into lifelong practice  
3. Critically evaluate the appropriate alternatives and draw a solution  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills  
6. Apply the Concept of management, Behaviour as individual, group and organization lifelong. |
| 37. 19PAU601A | Banking Law and Practice                         | 1. Understand the Concept of banking operations, functions, risk associated with and law pertaining to banking functions,  
2. Comprehend on the Indian banking system, its regulatory body and key macro indicators related to banks that affect the economy.  
3. Communicate orally and in written form the understanding of banking operations, functions, risk associated with and law pertaining to banking functions  
4. Apply the learning of the bank functions and operations lifelong.  
5. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.  
6. Comprehend and apply the laws related to banking. |
| 38. 19PAU601B | Insurance Law and Practice                       | 1. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.  
2. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.  
3. Communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning in India.  
4. Apply the learning of the insurance procedures, products, services and operations lifelong.  
5. Comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk in India.  
6. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution. |
| 39. 19PAU602A | Entrepreneurship                                | 1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.  
2. Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government. |
3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.
5. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.
6. Work in team and exhibit leadership skills

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<thead>
<tr>
<th>40. 19PAU602B</th>
<th>Personal Selling and Salesmanship</th>
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</thead>
<tbody>
<tr>
<td>1. Understand the Concept of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</td>
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<tr>
<td>2. Communicate orally and in written form the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</td>
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<tr>
<td>3. Apply the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control in lifelong practice.</td>
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<tr>
<td>4. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</td>
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<tr>
<td>5. Communicate in oral and written form and prepare report</td>
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<tr>
<td>6. Work in team and exhibit leadership skills</td>
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<tr>
<th>41. 19PAU603A</th>
<th>Information System Control and Audit</th>
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<tbody>
<tr>
<td>1. Understand the usage of information system in auditing.</td>
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<tr>
<td>2. Critically analyse and evaluate the need of Information system audit for the business continuity</td>
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<tr>
<td>3. Communicate orally and in written form the understanding of the usage of information system in auditing the business.</td>
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<tr>
<td>4. Understand the security, ethical and regulatory issues pertaining to use of information technology in auditing.</td>
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<td>5. Apply the understanding of the usage of latest developed information system in auditing as a lifelong practice.</td>
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<tr>
<td>6. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</td>
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<thead>
<tr>
<th>42. 19PAU603B</th>
<th>Strategic Management</th>
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<tbody>
<tr>
<td>1. Understand the strategic management concept, strategic process, strategic evaluation and formulation techniques.</td>
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<tr>
<td>2. Critically analyse and evaluate the internal and external environment using appropriate technique and formulate the strategy suitable for an organization.</td>
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<tr>
<td>3. Communicate orally and in written form the understanding of strategic management concept, strategic process, strategic evaluation and formulation techniques.</td>
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<td>4. Apply the understanding of the strategic management concept, strategic process, strategic evaluation and formulation techniques in lifelong practice.</td>
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</table>
| 47.  | 19PAU613A | Information System Control and Audit (Practical) | 1. Understand the concept concepts and procedures of  
2. Information system  
3. Analyse the case studies, understand the cyber fraud and apply the theoretical learning into lifelong practice.  
4. Critically evaluate the appropriate alternatives techniques for  
5. control audit  
3. Communicate in oral and written form and prepare report  
4. Communicate in oral and written form and prepare report  
6. Work in team and exhibit leadership skills |
| 48.  | 19PAU613B | Strategic Management (Practical) | 1. Understand the strategic management concept, strategic process, strategic evaluation and formulation techniques.  
2. Critically analyse and evaluate the internal and external environment using appropriate technique and formulate the strategy suitable for an organization.  
3. Understand the application of the latest concepts like Scrum framework, Agile methodology and design thinking  
4. Communicate orally and in written form the understanding of strategic management concept, strategic process, strategic evaluation and formulation techniques.  
5. Apply the understanding of the strategic management concept, strategic process, strategic evaluation and formulation techniques in lifelong practice.  
6. Work in teams and exhibit leadership skills. |
| 49.  | 19PAU691 | Project | 1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.  
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.  
3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.  
4. Apply the theoretical and practical learning of doing research into lifelong practice.  
5. Communicate in oral and written form and prepare report  
6. Work in team and exhibit leadership skills Utilise the IT applications for analysis and preparation of report. |
Name of the Department: **Computer Applications**

**Course:** BCA

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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<tbody>
<tr>
<td>1.</td>
<td>19LSU101</td>
<td>Language-I</td>
<td>1. <strong>மேற்கொள் கலோரியல்ப் பல்லி (சோட்டான் யம்பம் தற்சோர்), செற்கையட்டு மக்கர் சிரோன்பூலிண்ம். 500 இடுக்கு மேற்குக்கு மாற்றாட்சி வந்து பல்லக் பொறுப்பு.</strong>&lt;br&gt;2. கலோரியல்ப் பல்லி, பொருளாதாரக் பெருமையை அளக்கும் ஏற்காடு எளியேறுவது ஆன்மாவின் புதுப்பூற்றுக்கூடாட்சியான, மேற்கொள்விளக்கு உயரிக்கு.<strong>&lt;br&gt;3. எந்தெந்த தொகுதியைக் கொண்டுள்ளே, ஆன்மாவின் தொகுதியை விளக்கும் பொருளாதாரக் எளிதாக மாற்றும் சோட்டான் யம்பம் பொறுப்பு.</strong>&lt;br&gt;4. மேற்கொள்விளக்கு முன்னேற்பால் மேற்கொள் பல்லக் பொறுப்பு, பல்லக்கள் மேற்கொள் பற்றிக்கும்.<strong>&lt;br&gt;5. பொருளாதாரக் பல்லி மேற்கொள் பல்லக் பொறுத்து குறிப்பிட்டு மேற்கொள் பல்லக் பொறுப்பு, பல்லக்கள் மேற்கொள்.</strong>&lt;br&gt;6. மேற்கொள் பல்லக் பொறுப்பு மேற்கொள் பல்லக் பொறுப்பு பற்றிக்கும்.**</td>
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<td>2.</td>
<td>19CAU101</td>
<td>Programming Fundamentals using C / C++</td>
<td>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations. 2. Develop programs using the basic elements like control statements, Arrays and Strings . 3. understand about the dynamic memory allocation using pointers which is essential for utilizing memory 4. Understand about the code reusability with the help of user defined functions. 5. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems. 6. Understand the uses of preprocessors and various header file directives.</td>
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<tr>
<td>3.</td>
<td>19CAU102</td>
<td>Computer System Architecture</td>
<td>1. Students will acquire a basic knowledge about computer system architecture, arithmetic, digital circuits and the low - level programming skills. 2. Define different number systems, binary addition and subtraction, 2’s complement representation and operations with this representation. 3. Understand the inner workings and performance capabilities of microprocessors. 4. Understand the concept of registers and Instruction set. 5. Know the addressing modes and instruction format of various microprocessors. 6. Understand memory and I/O channels.</td>
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<td>4.</td>
<td>19CAU103</td>
<td>Computer Fundamentals</td>
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<td></td>
<td>1. Understand the meaning and basic components of a computer system,</td>
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<td>2. Define and distinguish Hardware and Software components of computer system,</td>
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<td>3. Explain and identify different computing machines during the evolution of computer system,</td>
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<td>4. Explain the functions of a computer,</td>
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<td>5. Identify the various input and output units and explain their purposes</td>
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<td>6. Understand the role of CPU and its components</td>
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<td>5.</td>
<td>19CAU111</td>
<td>Programming Fundamentals using C / C++ (Practical)</td>
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<tr>
<td></td>
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<td>1. Develop programs using the basic elements like control statements, Arrays and Strings.</td>
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<td>2. Solve the memory access problems by using pointers</td>
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<td>3. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</td>
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<td>4. Understand the uses of preprocessors and various header file directives.</td>
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<td>5. Use the characteristics of an object-oriented programming language in a program.</td>
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<td>6. Implement File handling mechanisms.</td>
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<td>6.</td>
<td>19CAU112</td>
<td>Computer System Architecture (Practical)</td>
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<td></td>
<td>1. Students will acquire a basic knowledge about computer system architecture, arithmetic, digital circuits and the low - level programming skills.</td>
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<td>2. Understand the inner workings and performance capabilities of advanced microprocessors.</td>
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<td>3. Analyze the use of encoder and decoder.</td>
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<td>4. Understand the working of half adder and full adder.</td>
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<td>5. Design and analyze memory, I/O devices and cache structures for processor.</td>
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<td>6. Evaluate the performance of computer systems.</td>
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<td>7.</td>
<td>19CAU113</td>
<td>Computer Fundamentals - Practical</td>
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<td></td>
<td>1. Modify text using various formatting options from the editing tools under the Home tab</td>
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<td></td>
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<td>2. Demonstrate the mechanics and uses of Word tables to organize and present data.</td>
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<td></td>
<td>3. Demonstrate working knowledge of using Word’s themes and clip art to create a variety of visual effects.</td>
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<td>4. Create and design a spreadsheet for general office use.</td>
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<td>5. Demonstrate the basic mechanics and navigation of an Excel spreadsheet.</td>
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<td>6. Demonstrate formatting techniques and presentation styles.</td>
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<td>8.</td>
<td>19AEC101</td>
<td>Environmental Studies</td>
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<tr>
<td></td>
<td></td>
<td>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</td>
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<td>2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.</td>
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<td>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</td>
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<td>4. Understand the transnational character of environmental problems and ways of addressing</td>
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</table>
them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

9. 19LSU201 Language – II
1. Develop the knowledge of interpersonal skills.
2. Establish and maintain social relationships.
3. Genres of literature will give moral values of life.
4. Develop communication skills in business environment
5. Communication skills will get developed.
6. Develop to have language competence.

10. 19ENU201 English
1. Develop the knowledge of interpersonal skills.
2. Establish and maintain social relationships.
3. Genres of literature will give moral values of life.
4. Develop communication skills in business environment
5. Communication skills will get developed.
6. Develop to have language competence.

11. 19CAU201 Programming in JAVA
1. Student will obtain knowledge of the structure and model of the Java programming language.
2. Use looping and decision constructs to solve problems.
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

12. 19CAU202 Discrete Structures
1. Familiar with elementary algebraic set theory.
<table>
<thead>
<tr>
<th>13. 19CAU203</th>
<th>Computer Networks And Internet Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Independently understand basic computer network technology.</td>
<td></td>
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<tr>
<td>2. Understand and explain Data Communications System and its components.</td>
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<tr>
<td>3. Enumerate the layers of the OSI model and TCP/IP.</td>
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<tr>
<td>4. Gain the skills and project-based experience needed for entry into web design and development careers.</td>
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<tr>
<td>5. Develop awareness and appreciation of the many ways that people access the web, and will be able to create standards-based websites that can be accessed by the full spectrum of web access technologies.</td>
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<tr>
<td>6. Select and apply mark-up languages for processing, identifying, and presenting of information in web</td>
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<thead>
<tr>
<th>14. 19CAU211</th>
<th>Programming in JAVA - Practical</th>
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</thead>
<tbody>
<tr>
<td>1. Student will obtain knowledge of the structure and model of the Java programming language.</td>
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<tr>
<td>2. How to use the Java programming language for various programming technologies (understanding).</td>
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<tr>
<td>3. Develop software in the Java programming language (application).</td>
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<tr>
<td>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis).</td>
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<tr>
<td>5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).</td>
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<tr>
<td>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation).</td>
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<thead>
<tr>
<th>15. 19CAU212</th>
<th>Discrete Structures - Practical</th>
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<tbody>
<tr>
<td>1. Familiar with elementary algebraic set theory.</td>
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<tr>
<td>2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.</td>
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<tr>
<td>3. Understand the basic principles of sets and operations in sets.</td>
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<td>4. Demonstrate an understanding of relations and functions and be able to determine their properties.</td>
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<tr>
<td>5. Demonstrate different traversal methods for trees and graphs.</td>
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<td>6. Initiate to knowledge from inference theory.</td>
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<tr>
<th>16. 19CAU213</th>
<th>Computer Networks And Internet Technologies - Practical</th>
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<tbody>
<tr>
<td>1. Gain the skills and project-based experience needed for entry into web design and development careers.</td>
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<tr>
<td>2. Develop awareness and appreciation of the many ways that people access the web, and will be able to</td>
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</table>
| 17. | 18CAU301 Data Structures | 1. Implement abstract data types for linear data structures.  
2. Apply the different linear and non-linear data structures to problem solutions.  
3. Analyze the applications of tree.  
4. Implement graph theory over various data structures.  
5. Critically analyze the various sorting algorithms.  
6. Able to use linear and non-linear data structures like stacks, queues, linked list etc. |
| 18. | 18CAU302 Operating Systems | 1. Design various Scheduling algorithms.  
2. Apply the principles of concurrency.  
3. Design deadlock, prevention and avoidance algorithms.  
4. Compare and contrast various memory management schemes.  
5. Apply the Security Concepts based on Authentication.  
6. Appreciate the role of operating system as System software. |
| 19. | 18CAU303 Advanced Networking | 1. Describe the functions of each layer in OSI and TCP/IP model.  
2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.  
3. Describe the Session layer design issues and Transport layer services.  
4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.  
5. Describe the functions of data link layer and explain the protocols.  
6. Explain the types of transmission media with real time applications |
| 20. | 18CAU304A Android Programming | 1. Analyze the Architecture and features of Android with another Mobile Operating System.  
2. Evaluate the standard of Kotlin language for developing Android Applications  
3. Apply knowledge for creating user Interface and develop activity for Android App.  
4. Evaluate the user interface architecture of Android for developing Android Apps  
5. Understand the implementation of SQLite database operations with Android.  
6. Design and implement Database Application and Content providers. |
| 21. | 18CAU304B Struts Framework | 1. Know about MVC and overview of JSP |
|   | 18CAU311          | Data Structures - Practical  | 2. Identify the components of a Struts Application and how to connect database in web based applications  
3. Know about the struts Sub elements and Control Tags  
4. Develop programs with Data Tags and Bean Tags  
5. Develop programs with HTML Tags and Logic Tags and able to construct enterprise-level web based applications  
6. Construct web based applications and Identify where data structures are appearing in them. |
|---|------------------|-------------------------------|---|
| 22. | 18CAU312        | Operating Systems - Practical | 1. Implement abstract data types for linear data structures.  
2. Apply the different linear and non-linear data structures to problem solutions.  
3. Analyze the applications of tree.  
4. Implement graph theory over various data structures.  
5. Critically analyze the various sorting algorithms.  
6. Able to use linear and non-linear data structures like stacks, queues, linked list etc. |
| 23. | 18CAU313        | Advanced Networking - Practical | 1. Describe the functions of each layer in OSI and TCP/IP model.  
2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.  
3. Describe the Session layer design issues and Transport layer services.  
4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.  
5. Describe the functions of data link layer and explain the protocols.  
6. Explain the types of transmission media with real time applications |
| 24. | 18CAU314A       | Android Programming - Practical | 1. Analyze the Architecture and features of Android with another Mobile Operating System.  
2. Evaluate the standard of Kotlin language for developing Android Applications  
3. Apply knowledge for creating user Interface and develop activity for Android App.  
4. Evaluate the user interface architecture of Android for developing Android Apps  
5. Understand the implementation of SQLite database operations with Android.  
6. Design and implement Database Application and Content providers. |
| 25. | 18CAU314B       | Struts Framework - Practical | 1. Know about MVC and overview of JSP  
2. Identify the components of a Struts Application and how to connect database in web based applications |
| 27. 18CAU401 | Relational Database Management Systems | 3. Know about the struts Sub elements and Control Tags  
4. Develop programs with Data Tags and Bean Tags  
5. Develop programs with HTML Tags and Logic Tags and able to construct enterprise-level web based applications  
6. Construct web based applications and Identify where data structures are appearing in them. |
| 28. 18CAU402 | Software Engineering | 1. Demonstrate an understanding of the elementary features of RDBMS  
2. Design conceptual models of a database using ER modelling for real life applications  
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database  
4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database  
5. Design efficient PL/SQL programs to access Oracle databases  
6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing. |
| 29. 18CAU403 | Web Programming | 1. Design web pages.  
2. Use technologies of Web Programming.  
3. Apply object-oriented aspects to Scripting.  
4. Create a basic website using HTML and Cascading Style Sheets.  
5. Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.  
6. Use scripting languages and web services to transfer data and add interactive components to web pages |
| 30. 18CAU404A | R Programming | 1. Learn how to install and configure software necessary for a statistical programming environment.  
2. Discuss generic programming language concepts as they are implemented in a high-level statistical language.  
3. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R |
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<td>31.</td>
<td>18CAU404B</td>
<td>Open Source Technologies</td>
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<td></td>
<td>1. Learned the need of open source technology, open source development model, application of open sources, aspects of open source movement</td>
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<td>2. The students will be aware about the problems with traditional commercial software.</td>
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<td>3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.</td>
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<td>4. The student will be familiar with creating of the server side scripting using PHP, implement PHP database connectivity, perform operation on database and open source database management system.</td>
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<td>5. The students will be familiar with Working of different web Servers.</td>
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<td>6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID</td>
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<td>32.</td>
<td>18CAU411</td>
<td>Relational Database Management Systems- Practical</td>
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<tr>
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<td></td>
<td>1. Demonstrate an understanding of the elementary features of RDBMS</td>
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<tr>
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<td>2. Design conceptual models of a database using ER modelling for real life applications</td>
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<td>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database</td>
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<td>4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database</td>
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<td>5. Design efficient PL/SQL programs to access Oracle databases</td>
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<td>6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing</td>
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<td>33.</td>
<td>18CAU412</td>
<td>Software Engineering - Practical</td>
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<td></td>
<td>1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.</td>
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<td>2. Apply systematic procedure for software design and deployment.</td>
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<td>3. Analyze a problem and identify and define the computing requirements to the problem.</td>
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<td>4. Formulate appropriate testing strategy for the given software system.</td>
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<td>5. Develop software projects based on current technology, and test the software using testing tools.</td>
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<td>6. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.</td>
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<td>34.</td>
<td>18CAU413</td>
<td>Web Programming - Practical</td>
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<td></td>
<td></td>
<td>1. Design web pages.</td>
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<td></td>
<td>2. Use technologies of Web Programming.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Apply object-oriented aspects to Scripting.</td>
</tr>
<tr>
<td>4. Create a basic website using HTML and Cascading Style Sheets.</td>
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<tr>
<td>5. Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.</td>
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<tr>
<td>6. Use scripting languages and web services to transfer data and add interactive components to web pages.</td>
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<tr>
<th>35. 18CAU414A R Programming - Practical</th>
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<tbody>
<tr>
<td>1. Learn how to install and configure software necessary for a statistical programming environment.</td>
</tr>
<tr>
<td>2. Discuss generic programming language concepts as they are implemented in a high-level statistical language.</td>
</tr>
<tr>
<td>3. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code.</td>
</tr>
<tr>
<td>4. Import external data into R for data processing and statistical analysis</td>
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<tr>
<td>5. Learn the main R data structures – vector and data frame</td>
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<tr>
<td>6. Learn the file processing in R</td>
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<tr>
<th>36. 18CAU414B Open Source Technologies - Practical</th>
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<tr>
<td>1. Leaned the need of open source technology, open source development model, application of open sources, aspects of open source movement</td>
</tr>
<tr>
<td>2. The students will be aware about the problems with traditional commercial software.</td>
</tr>
<tr>
<td>3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.</td>
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<tr>
<td>4. The student will be familiar with creating of the server side scripting using PHP, implement PHP database connectivity, perform operation on database and open source database management system.</td>
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<tr>
<td>5. The students will be familiar with Working of different web Servers.</td>
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<tr>
<td>6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID.</td>
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<tr>
<th>37. 17CAU501A Oracle (SQL/PL-SQL)</th>
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<tbody>
<tr>
<td>1. Develop efficient PL/SQL programs to access Oracle databases</td>
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<tr>
<td>2. Use some of the Oracle supplied PL/SQL packages to generate screen and file outputs</td>
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<tr>
<td>3. Design modular applications using packages</td>
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<td>4. Invoke native dynamic SQL to build runtime SQL statements</td>
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<tr>
<td>5. Manage data retrieval with cursors and cursor variables</td>
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<tr>
<td>6. Enhance performance using collection datatypes and bulk operations</td>
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<thead>
<tr>
<th>38. 17CAU501B Programming in Python</th>
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<tbody>
<tr>
<td>1. Develop algorithmic solutions to simple computational problems</td>
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<tr>
<td>2. Structure simple Python programs for solving problems.</td>
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<td>3. Decompose a Python program into functions.</td>
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<td>39.</td>
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|   |   | 5. Read and write data from/to files in Python Programs.  
|   |   | 6. Implement database and GUI applications |
|   |   | 1. State the basic concepts in information security  
|   |   | 2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.  
|   |   | 3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.  
|   |   | 4. The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.  
|   |   | 5. The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.  
|   |   | 6. The learner will gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath. |
| 40. | 17CAU502B | Data Mining |
|   |   | 1. Extract knowledge using data mining techniques and Implement Pre-process the data for mining applications and apply the association rules for mining the data  
|   |   | 2. Design and deploy appropriate classification techniques and decision trees.  
|   |   | 3. Understand the concept of clustering and its real time applications  
|   |   | 4. Explore recent trends in data mining such as web mining, spatial-temporal mining  
|   |   | 5. Able to know the basic concepts of data warehouse and OLAP operations  
|   |   | 6. Organize and Prepare the data needed for data mining using pre pre-processing techniques |
| 41. | 17CAU503A | Microprocessor |
|   |   | 1. Design and implement programs on 8086, ARM, PIC.  
|   |   | 2. CO2 Design I/O circuits.  
|   |   | 3. The program prepares students to successfully compete for employment in Electronics, Manufacturing and Embedded fields.  
|   |   | 4. Design Memory Interfacing circuits.  
|   |   | 5. Design and implement 8051 microcontroller based systems.  
|   |   | 6. Describe the architecture and instruction set of ARM microcontroller  
|   |   | 6. Assembly language programming will be studied as well as the design of various types of digital and analog interfaces |
| 42. | 17CAU503B | PC Hardware & Trouble Shooting |
|   |   | 1. Assemble/setup and upgrade personal computer systems  
|   |   | 2. Perform installation, configuration,  
|   |   | 3. Upgrading of hardware and software,  
<p>|   |   | 4. Install/connect associated peripherals |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</table>
| 43. CAU504A | Digital Image Processing | 1. Review the fundamental concepts of a digital image processing system.  
2. Analyze images in the frequency domain using various transforms.  
3. Evaluate the techniques for image enhancement and image restoration.  
4. Categorize various compression techniques.  
5. Interpret Image compression standards.  
6. Interpret image segmentation and representation techniques. |
| 44. CAU504B | Open Source Technologies | 1. Learned the need of open source technology, open source development model, application of open sources, aspects of open source movement.  
2. The students will be aware about the problems with traditional commercial software.  
3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.  
4. The student will be familiar with creating of the server side scripting using PHP, implement PHP database connectivity, perform operation on database and open source database management system.  
5. The students will be familiar with Working of different web Servers.  
6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID |
| 45. CAU511A | Oracle (SQL/PL-SQL) (Practical) | 1. Develop efficient PL/SQL programs to access Oracle databases.  
2. Use some of the Oracle supplied PL/SQL packages to generate screen and file outputs.  
3. Design modular applications using packages.  
4. Invoke native dynamic SQL to build runtime SQL statements.  
5. Manage data retrieval with cursors and cursor variables.  
| 46. CAU511B | Programming in Python (Practical) | 1. Develop algorithmic solutions to simple computational problems.  
2. Structure simple Python programs for solving problems.  
3. Decompose a Python program into functions.  
5. Read and write data from/to files in Python Programs.  
6. Implement database and GUI applications. |
| 47. CAU512A | Information Security (Practical) | 1. State the basic concepts in information security.  
2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations. |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Summary</th>
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</table>
| 17CAU512B   | Data Mining (Practical)                           | 3. Explain common vulnerabilities in computer programs including buffer overflow, time-of-check to time-of-use flaws, incomplete mediation.  
4. The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.  
5. The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.  
6. The learner will gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath.  
1. Extract knowledge using data mining techniques and implement pre-processing the data for mining applications and apply the association rules for mining the data.  
2. Design and deploy appropriate classification techniques and decision trees.  
3. Understand the concept of clustering and its real-time applications.  
4. Explore recent trends in data mining such as web mining, spatial-temporal mining.  
5. Able to know the basic concepts of data warehouse and OLAP operations.  
6. Organize and prepare the data needed for data mining using pre-processing techniques. |
| 17CAU513A   | Microprocessor (Practical)                         | 1. Design and implement programs on 8086, ARM, PIC.  
2. Design and implement memory interfacing circuits.  
3. Design and implement 8051 microcontroller based systems.  
4. Describe the architecture and instruction set of ARM microcontroller.  
5. Assembly language programming will be studied as well as the design of various types of digital and analog interfaces. |
| 17CAU513B   | PC Hardware & Trouble Shooting (Practical)         | 1. Assemble/setup and upgrade personal computer systems.  
2. Perform installation, configuration, upgrading of hardware and software.  
3. Install/connect associated peripherals.  
4. Diagnose in hardware and software and other peripheral equipment.  
5. Troubleshoot the problem. |
| 17CAU514A   | Digital Image Processing (Practical)               | 1. Review the fundamental concepts of a digital image processing system.  
2. Analyze images in the frequency domain using various transforms. |
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.
5. Interpret Image compression standards.
6. Interpret image segmentation and representation techniques

| 52. 17CAU514B | Open Source Technologies (Practical) | 1. Learned the need of open source technology, open source development model, application of open sources, aspects of open source movement
2. The students will be aware about the problems with traditional commercial software.
3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.
4. The student will be familiar with creating of the server side scripting using PHP, implement PHP database connectivity, perform operation on database and open source database management system.
5. The students will be familiar with Working of different web Servers.
6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID |

| 53. 17CAU601A | PHP Programming | 1. Write PHP scripts using operators to perform various functions
2. Design PHP scripts to handle HTML forms.
3. Implement different types of PHP functions.
4. Write regular expressions including modifiers, operators, and metacharacters.
5. Create PHP scripts using array.
6. Analyze and solve various database tasks using the PHP language. |

| 54. 17CAU601B | Unix / Linux Programming | 1. Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System
2. Demonstrate UNIX commands for file handling and process control
3. Write Regular expressions for pattern matching and apply them to various filters for a specific task
4. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem
5. Implement various file processing commands used in UNIX.
6. Construct various shell scripts for simple applications. |

| 55. 17CAU602A | Cloud Computing | 1. Define Cloud Computing and memorize the different Cloud service and deployment models
2. Describe importance of virtualization along with their technologies.
3. Use and Examine different cloud computing services
4. Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing
5. Describe the key components of Amazon web Service
6. Design & develop backup strategies for cloud data based on features |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</table>
| 17CAU602B  | Database Administration          | 1. Design, model and install any database management systems by using Oracle database as sample.  
2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance  
3. Define and devise transaction management, concurrency control, crash recovery components  
4. Examine and perform database administration roles and operations by using Oracle database system as a sample  
5. Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques.  
6. Configure, manage and maintain database, to audit and improve database performances and to use tools for database administration. |
| 17CAU603A  | Big Data Analytics               | 1. Work with big data tools and its analysis techniques  
2. Analyze data by utilizing clustering and classification algorithms  
3. Learn and apply different mining algorithms and recommendation systems for large volumes of data  
4. Perform analytics on data streams  
5. Learn NoSQL databases and management.  
6. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing |
| 17CAU603B  | System Programming               | 1. Organize the functionalities & components of system software & tools into different layers for efficient code generation.  
2. Apply the knowledge & technique to develop solutions to real world problems by compiling application programs.  
3. Ability to identify, formulate, and solve computer engineering problems with proper systematic & semantic approach.  
4. Develop possible program constructs for further code generation with Type checking & memory management strategy  
5. Design a simple compiler with tools & different with optimized techniques  
6. Design and implement system utility programs. |
| 17CAU611A  | PHP Programming (Practical)      | 1. Write PHP scripts using operators to perform various functions  
2. Design PHP scripts to handle HTML forms.  
3. Implement different types of PHP functions.  
4. Write regular expressions including modifiers, operators, and metacharacters.  
5. Create PHP scripts using array.  
6. Analyze and solve various database tasks using the PHP language. |
<p>| 17CAU611B  | Unix / Linux Programming (Practical) | 1. Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System. |</p>
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<tr>
<th>Code</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Practical</th>
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</table>
| 61.    | 17CAU612A                    | Cloud Computing (Practical)       | 1. Define Cloud Computing and memorize the different Cloud service and deployment models  
|        |                              |                                   | 2. Describe importance of virtualization along with their technologies.  
|        |                              |                                   | 3. Use and Examine different cloud computing services  
|        |                              |                                   | 4. Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing  
|        |                              |                                   | 5. Describe the key components of Amazon web Service  
|        |                              |                                   | 6. Design & develop backup strategies for cloud data based on features  |
| 62.    | 17CAU612B                    | Database Administration (Practical) | 1. Design, model and install any database management systems by using Oracle database as sample.  
|        |                              |                                   | 2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance  
|        |                              |                                   | 3. Define and devise transaction management, concurrency control, crash recovery components  
|        |                              |                                   | 4. Examine and perform data base administration roles and operations by using Oracle database system as a sample  
|        |                              |                                   | 5. Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques.  
|        |                              |                                   | 6. Configure, manage and maintain database, to audit and improve database performances and to use tools for database administration.  |
| 63.    | 17CAU613A / 17CAU613B        | Big Data Analytics (Practical) / System Programming (Practical) | 1. Work with big data tools and its analysis techniques  
|        |                              |                                   | 2. Analyze data by utilizing clustering and classification algorithms  
|        |                              |                                   | 3. Learn and apply different mining algorithms and recommendation systems for large volumes of data  
|        |                              |                                   | 4. Perform analytics on data streams  
|        |                              |                                   | 5. Learn NoSQL databases and management.  
|        |                              |                                   | 6. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing  |
| 64.    | 17CAU613B                    | System Programming (Practical)    | 1. Organize the functionalities & components of system software & tools into different layers for efficient code generation.  
|        |                              |                                   | 2. Apply the knowledge & technique to develop solutions to real world problems by compiling application programs.  |
3. ability to identify, formulate, and solve computer engineering problems with proper systematic & semantic approach.  
4. Develop possible program constructs for further code generation with Type checking & memory management strategy  
5. Design a simple compiler with tools & different with optimized techniques  
6. Design and implement system utility programs.
### Course: MCA

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>18CAP301</td>
<td>Database Management Systems</td>
<td>1. Define the terminology, features, classifications, and characteristics embodied in database systems.</td>
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<tr>
<td></td>
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<td>2. Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary.</td>
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<td></td>
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<td>3. Demonstrate an understanding of the relational data model.</td>
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<td>4. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.</td>
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<td>5. Formulate, using relational algebra, solutions to a broad range of query problems.</td>
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<td></td>
<td>6. Perform Database backup and recovery from catastrophic failure</td>
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<tr>
<td>2.</td>
<td>18CAP302</td>
<td>Computer Networks</td>
<td>1. To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.</td>
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<tr>
<td></td>
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<td>2. To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks,</td>
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<td>3. To be familiar with wireless networking concepts,</td>
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<td>4. To be familiar with contemporary issues in networking technologies</td>
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<td>5. To understand the functionalities needed for data communication into layers</td>
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<td>6. To know the various security methodology in network</td>
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<tr>
<td>3.</td>
<td>18CAP303</td>
<td>Advanced Java and Springs</td>
<td>1. Able to implement, compile, test and run Java program,</td>
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<tr>
<td></td>
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<td>2. Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API</td>
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<td>3. Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets</td>
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<td>4. Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.</td>
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<td>5. Write code with spring framework components.</td>
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<td>6. Use collection such as list, set, map in java programming</td>
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<td></td>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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</tbody>
</table>
|4. | 18CAP304    | Statistical Computing                            | 1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.  
                           |                                                        | 2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.  
                           |                                                        | 3. Communicate effectively in a variety of professional contexts.  
                           |                                                        | 4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.  
                           |                                                        | 5. Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.  
                           |                                                        | 6. Apply computer science theory and software development fundamentals to produce computing-based solutions.                               |
|5. | 18CAP305    | Management Support Systems                       | 1. Discuss today’s turbulent business environment and describe how organizations survive and even excel in such an environment.  
                           |                                                        | 2. Discuss the need for computerized support of managerial decision making.  
                           |                                                        | 3. Describe the conceptual foundation of the decision support system (DSS)  
                           |                                                        | 4. Describe the business intelligence (BI) methodology and relate them each other.  
                           |                                                        | 5. List the major tools of computerized decision support and major issues in implementing computerized decision support systems.  
                           |                                                        | 6. Define the conceptual foundations of decision making. |
|6. | 18CAP311    | Database Management Systems- Practical           | 1. Define the terminology, features, classifications, and characteristics embodied in database systems.  
                           |                                                        | 2. Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary.  
                           |                                                        | 3. Demonstrate an understanding of the relational data model.  
                           |                                                        | 4. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.  
                           |                                                        | 5. Formulate, using relational algebra, solutions to a broad range of query problems.  
<pre><code>                       |                                                        | 6. Perform Database backup and recovery from catastrophic failure. |
</code></pre>
<p>|7. | 18CAP312    | Computer Network - Practical                     | 1. To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.      |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>8. 18CAP313</td>
<td>Advanced Java and Springs- Practical</td>
<td>1. Able to implement, compile, test and run Java program, 2. Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API, 3. Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets, 4. Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application, 5. Write code with spring framework components, 6. Use collection such as list, set, map in java programming</td>
</tr>
<tr>
<td>9. 18CAP401</td>
<td>J2EE</td>
<td>1. Characterize the concepts J2SE and J2EE, 2. Develop Enterprise Applications using Session Bean, Entity Bean and MDB, 3. Demonstrate the hierarchy of Java classes to provide software solutions using Java APIs, 4. Analyze the components and patterns of Java Servlet architecture for web applications, 5. Apply systematic Java programming knowledge to connect backend and front end, 6. Implement the Java Servlet to transfer data</td>
</tr>
<tr>
<td>11. 18CAP403</td>
<td>Organizational Behaviour</td>
<td>1. Analyze individual and group behaviour, and understand the implications of organizational behaviour on the process of management, 2. Identify different motivational theories and evaluate motivational strategies used in a variety of organizational settings</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Course Content</td>
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</table>
2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance  
3. Define and devise transaction management, concurrency control, crash recovery components  
4. Examine and perform database administration roles  
5. Examine the database operations by using Oracle database system as a sample.  
6. Apply the knowledge of VLDB to control the distributed databases |
| 13. CAP404N | Cryptography And Network Security | 1. Classify the symmetric encryption techniques  
2. Illustrate various Public key cryptographic techniques  
3. Evaluate the authentication and hash algorithms.  
4. Summarize the intrusion detection and its solutions to overcome the attacks.  
5. Demonstrate the basic concepts of system level security  
6. Apply the block chain technology for security |
| 14. CAP404S | Software Testing | 1. Test the software by applying testing techniques to deliver a product free from bugs  
2. Evaluate the web applications using bug tracking tools.  
3. Investigate the scenario and the able to select the proper testing technique  
4. Explore the test automation concepts and tools  
5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma  
6. Evaluate the estimation of cost, schedule based on standard metrics |
| 15. CAP404W | XML | 1. Learn the basics of creating XML documents, transforming XML documents, and validating XML documents.  
2. More specifically, you will learn the basics and history of XML and how to write your own XML documents.  
3. Learn how to transform XML documents into documents of other types using XSLT.  
4. Learn how to write valid XML documents based on a DTD. |
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<tbody>
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<td>16.</td>
<td>18CAP404B</td>
<td>Managerial Economics</td>
</tr>
</tbody>
</table>
|   |   | 5. Combine XML with existing web technologies.  
6. Implement using XML Path language |
|   |   | 1. Understand the roles of managers in firms  
2. Understand the internal and external decisions to be made by managers  
3. Analyze the demand and supply conditions and assess the position of a company  
4. Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.  
5. Analyze real-world business problems with a systematic theoretical framework.  
6. Maintain product and cost analysis |
| 17. | 18CAP405D | Distributed Database Management System |
|   |   | 1. The physical structure of the database to handle data  
2. Students would be able to implement the logic by using tools like ERD  
3. Ability to normalize the database & understand the internal data structure  
4. Students would clearly understand the transaction system  
5. Extract the data efficiently  
6. Detect or Avoid deadlock using the deadlock handling method |
| 18. | 18CAP405N | TCP/IP |
|   |   | 1. Configure subnets using IP classes B and C  
2. Explain TCP/IP protocols, ports, sockets, and data encapsulation  
3. Describe the process of packet fragmentation and reassembly  
4. Explain the key features and functions of TCP and UDP  
5. Use Wireshark to identify ICMP request and reply packets  
6. Know the operation of DHCP |
| 19. | 18CAP405S | Object Oriented Analysis and Design with UML |
|   |   | 1. Understand of programming language concepts;  
2. Demonstrate the software engineering principles  
3. Apply the principles of software engineering to software design;  
4. Apply the knowledge of OOAD to complete large software project  
5. Analyze the deployment of UML diagrams for software design  
6. Apply the principles of software engineering quality principles for developing quality software |
| 20. | 18CAP405W | Web Services |
|   |   | 1. Understand the use of web services in B2C and B2B applications.  
2. Understand the design principles and application of SOAP  
3. To know the principles of REST based web services.  
4. Design collaborating web services according to a specification. |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Description</th>
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</table>
| 18CAP405B   | Corporate Planning  | 5. Implement an application that uses multiple web services in a realistic business scenario.  
6. Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them. |
| 18CAP411    | J2EE - Practical    | 1. Understand the strategic decisions that organizations make and have an ability to engage in strategic planning.  
2. Explain the basic concepts, principles and practices associated with strategy formulation and implementation.  
3. Integrate and apply knowledge gained in basic courses to the formulation and implementation of strategy from holistic and multi-functional perspectives.  
4. Analyze and evaluate critically real life company situations  
5. Develop creative solutions, using a strategic management perspective.  
6. Conduct and present a credible business analysis in a team setting.  |
| 18CAP412    | Mobile Computing - Practical | 1. Characterize the concepts J2SE and J2EE  
2. Develop Enterprise Applications using Session Bean, Entity Bean and MDB  
3. Demonstrate the hierarchy of Java classes to provide software solutions using Java APIs  
4. Analyze the components and patterns of Java Servlet architecture for web applications  
5. Apply systematic Java programming knowledge to connect backend and front end  
6. Implement the Java Servlet to transfer data  |
| 18CAP413D   | DBA – Practical     | 1. Design, model and install any database management systems by using Oracle database as sample.  
2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance  
3. Define and devise transaction management, concurrency control, crash recovery components |
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<tr>
<th>Course Code</th>
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<th>Course Description</th>
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</table>
| 18CAP413N   | Network security - Practical | 4. Examine and perform data base administration roles  
5. Examine the database operations by using Oracle database system as a sample.  
6. Apply the knowledge of VLDB to control the distributed databases |
| 18CAP413S   | Software Testing – Practical | 1. Classify the symmetric encryption techniques  
2. Illustrate various Public key cryptographic techniques  
3. Evaluate the authentication and hash algorithms.  
4. Summarize the intrusion detection and its solutions to overcome the attacks.  
5. Demonstrate the basic concepts of system level security  
6. Apply the block chain technology for security |
| 18CAP413W   | XML – Practical | 1. Learn the basics of creating XML documents, transforming XML documents, and validating XML documents.  
2. More specifically, you will learn the basics and history of XML and how to write your own XML documents.  
3. Learn how to transform XML documents into documents of other types using XSLT.  
4. Learn how to write valid XML documents based on a DTD.  
5. Combine XML with existing web technologies.  
6. Implement using XML Path language |
| 18CAP413B   | WAP - Practical | 1. Able to understand the infrastructure to develop mobile communication systems  
2. Able to characterize of different multiple access techniques in mobile communication.  
3. Know about NS2 script  
4. Simulate the network traffic and routing  
5. Measure the performance  
6. Demonstrate the OSPF routing |
| 17CAP501    | PHP5/ MySQL | 1. Implement regular expressions in PHP programming including modifiers, operators, and meta characters.  
2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.  
3. Analyze and solve various database tasks using the PHP language. |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Course Description</th>
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</table>
2. Implement ADO.Net concept in VB.Net and ASP.Net applications  
3. Create server side web applications using ASP.NET  
4. Analyze the concept of data sources and data bound controls in VB.NET and ASP.NET  
5. Demonstrate the working of ADO.Net controls for developing ASP.Net web applications  
6. Design the application using ASP.NET Web Server Control |
| 31.         | 17CAP503                           | 1. Formulate a real-world problem as a mathematical programming model.  
2. Understand the theoretical workings of the simple method for linear programming and perform iterations of it by hand.  
3. Understand the relationship between a linear program and its dual, including strong duality and complementary slackness  
4. Understand the importance of optimization techniques in industrial process management  
5. Understand the concept of Inventory theory in solving industry based optimization problems  
6. Estimate the time and cost for the process |
| 32.         | 17CAP504N                          | 1. To solve the problems in computer network system management  
2. To analyze the challenges in the implementation of ATM networks  
3. To implement SNMP Model in the management of computer networks  
4. To configure routers using computer network software tools  
5. To implement service level agreement in Computer Network management systems  
6. To know the Network Management Tools and Systems |
| 33.         | 17CAP504S                          | 1. Implement the concept of software effort estimation in developing software project.  
2. Develop a responsible attitude towards the use of computer as well as the technology.  
3. Evaluate the risks during the development of software projects  
4. Understand the organization behaviour in software project management.  
5. Implement team management process in developing quality software  
6. Monitor the software project management in various ways such as cost control, performance control, etc., |
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<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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| 34. 17CAP504W | Angular JS | 1. To apply an AngularJS Single Page Application from scratch  
2. To build an awesome User Interface  
3. To create and bind controllers with JavaScript  
4. To separate the model, view, and controller layers of your application and implement them using AngularJS  
5. To integrate and enhance Angular applications with other useful JavaScript libraries such as Node.js  
6. Test the application using AngularJS |
| 35. 17CAP504B | MIS Framework | 1. Analyze the major technological, organizational, behavioural, and ethical issues facing today’s information systems professional.  
2. Implement IT strategy in managing the information system of any organization.  
3. Analyze the emerging technologies  
5. Implement the principles of Business Process Engineering in improving the business of any organization  
6. Analyze the critical success factors in implementing IT applications |
| 36. 17CAP504D | Data Mining and Data Warehousing | 1. To understand the data mining process of voluminous data using OLAP  
2. To implement the pre-processing concept in data mining applications  
3. To apply the data mining algorithms on big data to extract useful data  
4. To implement data mining techniques for complex data types  
5. To implement Decision Support System concept in data mining for developing intelligence business applications  
6. To apply the web data mining |
| 37. 17CAP505N | Distributed Computing | 1. To develop and apply knowledge of parallel and distributed computing techniques and methodologies.  
2. To Apply design, development, and performance analysis on parallel and distributed applications  
3. To implement the application of fundamental Computer Science methods  
4. To implement the algorithms in the development of parallel applications.  
5. Implement distributed shared memory concepts in distributed computing.  
6. To apply Authentication methods in distributed application |
| 38. 17CAP505S | Software Metrics | 1. To analyze the importance of modelling and modelling languages  
2. To apply the basic quality tools in software development  
3. Analyze the software process metrics in the process of software testing |
<table>
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<tr>
<th>No.</th>
<th>Code</th>
<th>Course Title</th>
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<th>6.</th>
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<tbody>
<tr>
<td>39</td>
<td>17CAP505W</td>
<td>Semantic Web</td>
<td>Analyze fundamental concepts, advantages and limits of the semantic web</td>
<td>Implement ontologies in the context of developing semantic web</td>
<td>Implement RDF framework and associated technologies for developing semantic web</td>
<td>Implement semantic Web Tools like Jena and SPARL for developing architecture for semantic web</td>
<td>Analyze the social network data</td>
<td>Implement the problem using the web ontology language</td>
</tr>
<tr>
<td>40</td>
<td>17CAP505B</td>
<td>Taxation Practices</td>
<td>Analyze the procedures in Assessing firms and associations</td>
<td>Analyze the need for assessing the undivided families</td>
<td>Apply the advance payment procedures in the taxation practices</td>
<td>Apply the procedure for registration and cancellation in central sales taxation</td>
<td>Learn various components related to the theme of tax liability determination</td>
<td>Analyze the wealth tax</td>
</tr>
<tr>
<td>41</td>
<td>17CAP505D</td>
<td>Big Data Analytics</td>
<td>Analyze the big data analytic techniques for useful business applications.</td>
<td>Implement the concept of virtualization and abstraction in analyzing big data</td>
<td>Analyze the HADOOP and Map Reduce technologies associated with big data analytics</td>
<td>Understand the fundamentals of various big data analysis techniques</td>
<td>Implement the integration of data sources in operationalizing Big Data</td>
<td>Implement the text analytics using Hadoop</td>
</tr>
<tr>
<td>42</td>
<td>17CAP511</td>
<td>PHP5/ MySQL - Practical</td>
<td>Implement regular expressions in PHP programming including modifiers, operators, and meta characters.</td>
<td>Create PHP programs that use various PHP library functions, and that manipulate files and directories.</td>
<td>Analyze and solve various database tasks using the PHP language.</td>
<td>Create server side web applications using PHP and MySQL.</td>
<td>Analyze the structure of an E-Mail message</td>
<td>Develop the files and directories management operation</td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Course Code</td>
<td>Course Title - Practical</td>
<td>Details</td>
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</table>
| 44.    | 17CAP513N   | Network Simulator - Practical | 1. To solve the problems in computer network system management  
2. To analyze the challenges in the implementation of ATM networks  
3. To implement SNMP Model in the management of computer networks  
4. To configure routers using computer network software tools  
5. To implement service level agreement in Computer Network management systems  
6. To know the Network Management Tools and Systems |
| 45.    | 17CAP513S   | Software Development - Practical Using Moodle | 1. Implement the concept of software effort estimation in developing software project.  
2. Develop a responsible attitude towards the use of computer as well as the technology.  
3. Evaluate the risks during the development of software projects  
4. Understand the organization behaviour in software project management.  
5. Implement team management process in developing quality software  
6. Monitor the software project management in various ways such as cost control, performance control, etc., |
| 46.    | 17CAP513W   | Angular JS -Practical | 1. To apply an AngularJS Single Page Application from scratch  
2. To build an awesome User Interface  
3. To create and bind controllers with JavaScript  
4. To separate the model, view, and controller layers of your application and implement them using AngularJS  
5. To integrate and enhance Angular applications with other useful JavaScript libraries such as Node.js  
6. Test the application using AngularJS |
| 47.    | 17CAP513B   | MIS -Practical | 1. Discuss today’s turbulent business environment and describe how organizations survive and even excel in such an environment.  
2. Discuss the need for computerized support of managerial decision making.  
3. Describe the conceptual foundation of the decision support system (DSS)  
4. Describe the business intelligence (BI) methodology and relate them each other. |
5. List the major tools of computerized decision support and major issues in implementing computerized decision support systems.
6. Define the conceptual foundations of decision making.

<table>
<thead>
<tr>
<th>48. 17CAP513D</th>
<th>Data Mining - Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To understand the data mining process of voluminous data using OLAP</td>
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<td>2. To implement the pre-processing concept in data mining applications</td>
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<tr>
<td>3. To apply the data mining algorithms on big data to extract useful data</td>
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<tr>
<td>4. To implement data mining techniques for complex data types</td>
<td></td>
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<tr>
<td>5. To implement Decision Support System concept in data mining for developing intelligence business applications</td>
<td></td>
</tr>
<tr>
<td>6. To apply the web data mining</td>
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</tbody>
</table>
Name of the Department: **Computer Science**

**Course:** B.Sc. Computer Science (Cognitive Systems)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1.     | 19LSU101    | Language –I        | 1. Develop programs using the basic elements like control statements, Arrays and Strings.  
                                                  2. understand about the dynamic memory allocation using pointers which is essential for utilizing memory  
                                                  3. Understand about the code reusability with the help of user defined functions.  
                                                  4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.  
                                                  5. Use the characteristics of an object-oriented programming language in a program.  
                                                  6. Use the basic object-oriented design principles in computer problem solving. |
| 2.     | 19CGU101    | Programming Fundamentals using C / C++ | 1. Ability to work in Windows 7 operating system, its tools and utilities.  
                                                  2. Install and configure Windows 2012 server and client.  
                                                  5. Monitor server OS of Windows  
| 3.     | 19CGU102    | Operating Systems  | 1. Understand the meaning and basic components of a computer system,  
                                                  2. Gain knowledge about five generations and classification of computer system,  
                                                  3. Explain the functions of a computer, |
| 4.     | 19CGU103    | Computer Fundamentals | |
| 5. | Programming Fundamentals using C / C++ - Practical | 1. Develop programs using the basic elements like control statements, Arrays and Strings.  
2. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory.  
3. Understand about the code reusability with the help of user defined functions.  
4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.  
5. Use the characteristics of an object-oriented programming language in a program.  
6. Use the basic object-oriented design principles in computer problem solving. |
| 6. | Operating Systems – Practical | 1. Ability to work in Windows 7 operating system, its tools and utilities.  
2. Install and configure Windows 2012 server and client.  
2. Demonstrate the basic mechanics and navigation of an Excel spreadsheet.  
3. Demonstrate the use of basic functions and formulas  
4. Create applications using VBA code in Excel  
5. Ability to develop macros.  
6. Creating interactive worksheets |
| 8. | Environmental Studies | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. |
| 9. | Language – II | 1. இன்று முலைவுறையும் நமது செய்திகளைக் கைப்பற்றும் கற்றே, மீண்டும் பார்த்தேக் இவையும் கையில் கொண்டு
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<tbody>
<tr>
<td>1.</td>
<td>Develop the knowledge of interpersonal skills.</td>
<td>2. Establish and maintain social relationships.</td>
</tr>
<tr>
<td>3.</td>
<td>Genres of literature will give moral values of life.</td>
<td>4. Develop communication skills in business environment</td>
</tr>
<tr>
<td>5.</td>
<td>Communication skills will get developed.</td>
<td>6. Develop to have language competence.</td>
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<tbody>
<tr>
<td>7.</td>
<td>Understand the functions of each layer in OSI and TCP/IP model.</td>
<td>2. Explain the multiplexing, switching concept and types of transmission media with real time examples.</td>
</tr>
<tr>
<td>3.</td>
<td>Understand the error detection and correction methods and can implement the data link layer protocols</td>
<td>4. Understand channel error detection and correction, MAC protocols, Ethernet and WLAN.</td>
</tr>
<tr>
<td>5.</td>
<td>Learn different medium access method to avoid collision and to learn about routing table.</td>
<td>6. Learn basic functionalities of transport layer and application layer.</td>
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<tbody>
<tr>
<td>8.</td>
<td>Familiar with elementary algebraic set theory.</td>
<td>2. Acquire a fundamental understanding of the core concepts in growth of functions.</td>
</tr>
<tr>
<td>3.</td>
<td>Describe the method of recurrence relations.</td>
<td>4. Get wide knowledge about graphs and trees</td>
</tr>
<tr>
<td>5.</td>
<td>Initiate to knowledge from inference theory</td>
<td>6. Solve problems with the help of tools of mathematical analysis.</td>
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<tr>
<td>9.</td>
<td>Design a knowledge-based system.</td>
<td>2. Understand service lifecycle model</td>
</tr>
<tr>
<td>3.</td>
<td>Know the key principles models and concepts of service management</td>
<td>4. Understand the process management and risk management</td>
</tr>
<tr>
<td>5.</td>
<td>Know the challenges in providing IT infrastructure services</td>
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<tr>
<td>6.</td>
<td>Understand the event management concepts.</td>
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<tr>
<td>14.</td>
<td>19CGU211</td>
<td>Computer Networks – Practical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.</td>
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<tr>
<td></td>
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<td>2. Understand IP Addressing Fundamentals</td>
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<td>4. Learn about host name resolution and the Domain Name System (DNS).</td>
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<td>5. Learn about services and operations of DHCP Servers and Domain Name Servers</td>
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<td>6. To compare and contrast IP routing protocols</td>
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<tr>
<td>15.</td>
<td>19CGU212</td>
<td>Discrete Structures – Practical</td>
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<tr>
<td></td>
<td></td>
<td>1. Familiar with elementary algebraic set theory.</td>
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<td>2. Acquire a fundamental understanding of the core concepts in growth of functions.</td>
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<td>3. Describe the method of recurrence relations.</td>
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<td>4. Get wide knowledge about graphs and trees</td>
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<td>5. Initiate to knowledge from inference theory</td>
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<td></td>
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<td>6. Solve problems with the help of tools of mathematical analysis.</td>
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<td>16.</td>
<td>19CGU213</td>
<td>Web Technologies - Practical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Analyze a web page and identify its elements and attributes.</td>
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<td>2. Create a HTML page with formatting text tags, tables and lists.</td>
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<td>3. Creating a HTML file with Frames.</td>
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<td>6. Create XML documents.</td>
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<tr>
<td>Sl. No</td>
<td>Course Code</td>
<td>Name of the Course</td>
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<tr>
<td>1.</td>
<td>17CSU501</td>
<td>Information Security</td>
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<td>2.</td>
<td>17CSU501</td>
<td>Network Programming</td>
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<tr>
<td>3.</td>
<td>17CSU502</td>
<td>Microprocessor</td>
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<td>4.</td>
<td>17CSU502</td>
<td>Digital Image Processing</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<tr>
<td>17CSU503 A</td>
<td>Machine Learning</td>
<td>6. Design &amp; Synthesize color image processing and its real world applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Remember the basic concepts and techniques of Machine Learning.</td>
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<td></td>
<td></td>
<td>2. Develop skills of using recent machine learning software for solving practical problems.</td>
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<td>3. of doing independent study and research.</td>
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<td>4. To recognize the characteristics of machine learning that make it useful to real-world problems.</td>
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<td>5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.</td>
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<td>6. To effectively use machine learning toolboxes.</td>
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<tr>
<td>17CSU503 B</td>
<td>Introduction to Data Sciences</td>
<td>6. Install and use R for simple programming tasks.</td>
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<td></td>
<td></td>
<td>2. Extend the functionality of R by using add-on packages.</td>
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<td>3. Extract data from files and other sources and perform various data manipulation tasks on them.</td>
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<td>4. Code statistical functions in R.</td>
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<td>5. Use R Graphics and Tables to visualize results of various statistical operations on data.</td>
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<td>6. Apply the knowledge of R gained to data Analytics for real life applications.</td>
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<tr>
<td>17CSU504 A</td>
<td>Oracle (SQL/PL-SQL)</td>
<td>1. Understand the ORACLE software for developing databases and using them.</td>
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<tr>
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<td>2. Using the SQL *plus interface and its commands.</td>
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<td>3. Creating, altering tables, views, indexes, synonyms and constraints using DDL statements.</td>
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<td>4. Querying the database using DML statements and write complex queries for information retrieval.</td>
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<td>5. Apply transaction controls statements in Oracle.</td>
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<td>6. Write procedures and functions using PL/SQL.</td>
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<tr>
<td>17CSU504 B</td>
<td>Programming in Python</td>
<td>Upon completion of this the course students will be able to:</td>
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<tr>
<td></td>
<td></td>
<td>1. Develop algorithmic solutions to simple computational problems.</td>
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<td>2. Structure simple Python programs for solving problems.</td>
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<td>3. Learn to use logical constructs in Python.</td>
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<td>4. Decompose a Python program into functions.</td>
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<td>5. Represent compound data using Python lists, tuples, dictionaries.</td>
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<td>6. Read and write data from/to files in Python Programs.</td>
</tr>
<tr>
<td>17CSU511 A</td>
<td>Information Security – Practical</td>
<td>A student who successfully completes this course should at a minimum be able to:</td>
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<tr>
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<td>1. Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.</td>
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<td>2. State the basic concepts in information security.</td>
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<td>3. Explain concepts related to applied cryptography including the techniques for crypto-analysis symmetric and asymmetric cryptography.</td>
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<td>4. Use digital signature, message authentication code, hash functions and modes of encryption operations.</td>
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<td>5. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.</td>
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<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Description</td>
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<tr>
<td>10. 17CSU511 B</td>
<td>Network Programming – Practical</td>
<td>6. Understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications. Having successfully completed this course, the student will be able to: 1. Understand the fundamental concepts of networks 2. Demonstrate mastery of main protocols comprising the Internet. 3. Develop skills in network programming techniques. 4. Implement network services that communicate through the Internet. 5. Apply the client-server model in networking applications. 6. Practice networking commands available through the operating systems.</td>
</tr>
<tr>
<td>11. 17CSU512 A</td>
<td>Microprocessor – Practical</td>
<td>1. Apply the fundamentals of assembly level programming of microprocessors. 2. Build a program on a microprocessor using arithmetic &amp; logical instruction set of 8086. 3. Develop the assembly level programming using 8086 loop instruction set. 4. Write programs based on string and procedure for 8086 microprocessor. 5. Analyze abstract problems and apply a combination of hardware and software to address the problem. 6. Make use of standard test and measurement equipment to evaluate digital interfaces.</td>
</tr>
<tr>
<td>12. 17CSU512 B</td>
<td>Digital Image Processing – Practical</td>
<td>1. Remember the fundamental concepts of image processing. 2. Explain different Image enhancement techniques. 3. Understand and review image transforms. 4. Analyze the basic algorithms used for image processing &amp; image compression with morphological image processing. 5. Contrast Image Segmentation and Representation. 6. Design &amp; Synthesize Color image processing and its real world applications.</td>
</tr>
<tr>
<td>13. 17CSU513 A</td>
<td>Machine Learning – Practical</td>
<td>On successful completion of the course the student should be: 1. Remember the basic concepts and techniques of Machine Learning. 2. Develop skills of using recent machine learning software for solving practical problems. 3. of doing independent study and research. 4. To recognize the characteristics of machine learning that make it useful to real-world problems. 5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. 6. To effectively use machine learning toolboxes.</td>
</tr>
<tr>
<td>14. 17CSU513 B</td>
<td>Introduction to Data Sciences – Practical</td>
<td>1. Install and use R for simple programming tasks. 2. Extend the functionality of R by using add-on packages. 3. Extract data from files and other sources and perform various data manipulation tasks on them. 4. Code statistical functions in R. 5. Use R Graphics and Tables to visualize results of various statistical operations on data. 6. Apply the knowledge of R gained to data Analytics for real life applications.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Prerequisites</td>
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<tr>
<td>15</td>
<td>17CSU514 A</td>
<td>Oracle (SQL/PL-SQL) – Practical</td>
</tr>
<tr>
<td>16</td>
<td>17CSU514 B</td>
<td>Programming in Python – Practical</td>
</tr>
<tr>
<td>17</td>
<td>17CSU601 A</td>
<td>Cloud Computing</td>
</tr>
<tr>
<td>18</td>
<td>17CSU601 B</td>
<td>System Programming</td>
</tr>
<tr>
<td>19</td>
<td>17CSU602 A</td>
<td>Data Mining</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Upon completion of this course, students will be able to:</td>
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</table>
| 20. 17CSU602 B | Computer Graphics                           | 1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.  
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.  
3. Use of geometric transformations on graphics objects and their application in composite form.  
4. Extract scene with different clipping methods and its transformation to graphics display device.  
5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.  
6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this. |
| 21. 17CSU603 A | PHP Programming                             | 1. Write PHP scripts using operators to perform various functions  
2. Design PHP scripts to handle HTML forms.  
3. Implement different types of PHP functions.  
4. Write regular expressions including modifiers, operators, and metacharacters.  
5. Create PHP scripts using array.  
6. Develop dynamic web pages. |
| 21. 17CSU603 B | Unix / Linux Programming                    | 1. This course teaches the student the concepts and principles that underlie modern operating systems, and a practice component to relate theoretical principles with operating system implementation.  
2. Implement operating system abstractions in the development of application programs  
3. Apply the principles of concurrency and synchronization to write correct concurrent programs/software  
4. Implement basic resource management techniques like scheduling or time management, space management  
5. Learn about processes and processor management, memory management schemes, file system and secondary storage management.  
6. Learn about issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection |
| 22. 17CSU611 A | Cloud Computing – Practical                 | Upon completion of this course the students will be able to:  
1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.  
2. Know the architecture of the cloud and the usage of clouds.  
3. Secure their data from the security issues.  
4. Make the students to work based on the various service level agreements.  
5. Work with the traditional cloud and Microsoft azure, etc.  
6. Provide a good understanding of the concepts, standards and protocols in Cloud computing |
| 23. 17CSU611 A | System Programming – Practical              | 1. Understand different components of system software.  
2. This course enables for good understanding of the role of system programming and the scope of duties and tasks of a system programmer. |
| 24. 17CSU611 B | System Programming – Practical              | 1. Understand different components of system software.  
2. This course enables for good understanding of the role of system programming and the scope of duties and tasks of a system programmer. |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>3.</td>
<td>This course enables to</td>
<td>learn the concepts and principles of developing system-level software (e.g.,</td>
</tr>
<tr>
<td></td>
<td>understand the basics</td>
<td>compiler, and networking software)</td>
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<td></td>
<td>of system programs like</td>
<td>editors, compiler, assembler, linker, loader, interpreter and debugger.</td>
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<td></td>
<td>Understand how linker</td>
<td>and loader create an executable program from an object module created by</td>
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<td></td>
<td>and loader</td>
<td>assembler and compiler.</td>
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<tr>
<td>25.</td>
<td>17CSU612 A Data Mining</td>
<td>Upon completion of this course students will be able to:</td>
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<tr>
<td></td>
<td>– Practical</td>
<td>1. Understand the basic concepts and techniques of Data Mining</td>
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<tr>
<td></td>
<td></td>
<td>2. Extract knowledge using data mining techniques and Implement Preprocess</td>
</tr>
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<td></td>
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<td>the data for mining applications and apply the association rules for mining</td>
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<td></td>
<td></td>
<td>the data</td>
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<td>3. Design and deploy appropriate classification techniques</td>
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<td>4. Understand the concept of clustering and its real time applications</td>
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<td></td>
<td>5. Explore recent trends in data mining such as web mining, spatial-temporal</td>
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<td></td>
<td></td>
<td>mining</td>
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<td>6. Analyze the basic concepts of data warehouse and OLAP operations</td>
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<td>26.</td>
<td>17CSU612 B Computer</td>
<td>Understand the basics of computer graphics, different graphics systems and</td>
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<td></td>
<td>Graphics – Practical</td>
<td>applications of computer graphics.</td>
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<td></td>
<td></td>
<td>2. Discuss various algorithms for scan conversion and filling of basic objects</td>
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<td></td>
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<td>and their comparative analysis.</td>
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<td>3. Use of geometric transformations on graphics objects and their application</td>
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<td>in composite form.</td>
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<td>4. Extract scene with different clipping methods and its transformation to</td>
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<td>graphics display device.</td>
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<td>5. Explore projections and visible surface detection techniques for display</td>
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<td></td>
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<td>of 3D scene on 2D screen.</td>
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<td>6. Render projected objects to naturalize the scene in 2D view and use of</td>
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<td>illumination models for this.</td>
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<tr>
<td>27.</td>
<td>17CSU613 A PHP Programming</td>
<td>Students will be able to write PHP scripts using operators to perform various</td>
</tr>
<tr>
<td></td>
<td>– Practical</td>
<td>functions</td>
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<td></td>
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<td>2. Design PHP scripts to handle HTML forms.</td>
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<td></td>
<td>3. Implement different types of PHP functions.</td>
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<td>4. Write regular expressions including modifiers, operators, and metacharacters</td>
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<td>5. Create PHP scripts using array.</td>
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<td>6. Develop dynamic web pages.</td>
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<tr>
<td>28.</td>
<td>17CSU613 B Unix / Linux</td>
<td>This course teaches the student the concepts and principles that underlie</td>
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<tr>
<td></td>
<td>Programming – Practical</td>
<td>modern operating systems, and a practice component to relate theoretical</td>
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<td></td>
<td></td>
<td>principles with operating system implementation.</td>
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<td></td>
<td></td>
<td>2. Implement operating system abstractions in the development of application</td>
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<td>programs</td>
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<td></td>
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<td>3. Apply the principles of concurrency and synchronization to write correct</td>
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<td>concurrent programs/software</td>
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<td>4. Implement basic resource management techniques like scheduling or time</td>
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<td>management</td>
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<td>Course Code</td>
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<tr>
<td>18CU301</td>
<td>Data Structures</td>
<td>Implement abstract data types for linear data structures.</td>
</tr>
<tr>
<td>18CU303</td>
<td>Computer Networks</td>
<td>Understand the functions of each layer in OSI and TCP/IP model.</td>
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<tr>
<td>18CU304 A</td>
<td>Android Programming</td>
<td>Design and develop useful Android applications with compelling</td>
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<td>18CU304 B</td>
<td>Programming in Visual Basic /</td>
<td>Construct appropriate user interfaces for simple programs, and</td>
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<td>Gambas</td>
<td>design systems with minimal complexity and maximal functionality.</td>
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<td></td>
<td>18CSU311</td>
<td>Data Structures – Practical</td>
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</tbody>
</table>
| 34.| 18CSU311      | Data Structures – Practical  | 1. Implement abstract data types for linear data structures.  
2. Apply the different linear and non-linear data structures to problem solutions.  
3. Analyze the applications of tree.  
4. Implement graph theory over various data structures.  
5. Critically analyze the various sorting algorithms.  
12. Apply searching algorithms over various data structures. |
| 35.| 18CSU312      | Operating Systems – Practical| 1. Design various Scheduling algorithms.  
2. Apply the principles of concurrency.  
3. Design deadlock, prevention and avoidance algorithms.  
4. Compare and contrast various memory management schemes.  
5. Apply the Security Concepts based on Authentication.  
13. Work in MS Windows and LINUX environment. |
| 36.| 18CSU313      | Computer Networks – Practical| 1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.  
2. Simulate and implement stop and wait protocol for noisy channel.  
3. Simulate and implement go back n sliding window protocol.  
4. Simulate and implement selective repeat sliding window protocol.  
5. Simulate and implement distance vector routing algorithm  
| 37.| 18CSU314      | Android Programming – Practical| 1. Design and develop useful Android applications with compelling user interfaces by using, extending, and creating your own layouts and Views and using Menus.  
2. Analyze the Architecture and features of Android with another Mobile Operating System.  
3. Evaluate the standard of Kotlin language for developing Android Applications  
4. Apply knowledge for creating user Interface and develop activity for Android App.  
5. Evaluate the user interface architecture of Android for developing Android Apps  
6. Understand the implementation of SQLite database operations with Android. |
| 38.| 18CSU314      | Programming in Visual Basic / Gambas - Practical| 1. Construct appropriate user interfaces for simple programs, and design systems with minimal complexity and maximal functionality.  
2. Understand computer programming using the VISUAL BASIC programming language.  
3. Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.)  
4. Develop a Graphical User Interface (GUI) based on problem description  
5. Develop and debug applications using Visual Basic  
6. Emphasize on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. |
<table>
<thead>
<tr>
<th>39.</th>
<th>18CSU401</th>
<th>Design and Analysis of Algorithms</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Learn to choose appropriate advanced data structure for given problem</td>
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<td></td>
<td></td>
<td>2. Knowledge to calculate complexity.</td>
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<td></td>
<td></td>
<td>3. Select appropriate design techniques to solve real world problems.</td>
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<td></td>
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<td>4. Apply the dynamic programming technique to solve the problems.</td>
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<td>5. Apply the greedy programming technique to solve the problems.</td>
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<td>6. Select a proper pattern matching algorithm for given problem.</td>
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<tr>
<th>40.</th>
<th>18CSU402</th>
<th>Software Engineering</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.</td>
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<td></td>
<td></td>
<td>2. Apply systematic procedure for software design and deployment.</td>
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<td>3. Analyze a problem and identify and define the computing requirements to the problem.</td>
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<td>4. Formulate appropriate testing strategy for the given software system.</td>
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<td>5. Develop software projects based on current technology, and test the software using testing tools.</td>
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<td>6. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.</td>
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<thead>
<tr>
<th>41.</th>
<th>18CSU403</th>
<th>Database Management Systems</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Demonstrate an understanding of the elementary features of RDBMS</td>
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<tr>
<td></td>
<td></td>
<td>2. Design conceptual models of a database using ER modeling for real life applications</td>
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<td></td>
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<td>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database</td>
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<td></td>
<td>4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database</td>
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<td>5. Retrieve any type of information from a database by formulating complex queries in SQL.</td>
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<tr>
<td></td>
<td></td>
<td>6. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</td>
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<tr>
<th>42.</th>
<th>18CSU404 A</th>
<th>HTML Programming</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Understand the fundamentals of HTML and use different formatting options</td>
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<tr>
<td></td>
<td></td>
<td>2. Create tables and frames</td>
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<tr>
<td></td>
<td></td>
<td>3. Insert a graphic and links within a web page.</td>
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<tr>
<td></td>
<td></td>
<td>4. Insert ordered and unordered lists within a web page.</td>
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<tr>
<td></td>
<td></td>
<td>5. Use cascading style sheets.</td>
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<tr>
<td></td>
<td></td>
<td>6. Validate and publish a web page.</td>
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<tr>
<th>43.</th>
<th>18CSU404 B</th>
<th>XML Programming</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Learning rules and techniques to create well-formed XML documents, learning to use XML namespaces correctly.</td>
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<td></td>
<td>2. Constructing Document Type Definitions and XML Schema documents that can be used to validate XML documents (structure, content).</td>
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<td></td>
<td>3. Developing dynamic web pages using XSL, applying XSLT transformations and formatting to XML documents (XSL, XPath).</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<td>-----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 44. 18CSU411 | Design and Analysis of Algorithms - Practical | 1. Learn to choose appropriate advanced data structure for given problem  
2. Knowledge to calculate complexity.  
3. Select appropriate design techniques to solve real world problems.  
4. Apply the dynamic programming technique to solve the problems.  
5. Apply the greedy programming technique to solve the problems.  
6. Select a proper pattern matching algorithm for given problem. |
| 45. 18CSU412 | Software Engineering – Practical       | 1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.  
2. Apply systematic procedure for software design and deployment.  
3. Analyze a problem and identify and define the computing requirements to the problem.  
4. Formulate appropriate testing strategy for the given software system.  
5. Develop software projects based on current technology, and test the software using testing tools.  
6. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time. |
| 46. 18CSU413 | Database Management Systems – Practical | 1. Demonstrate an understanding of the elementary features of RDBMS  
2. Design conceptual models of a database using ER modeling for real life applications  
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database  
4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database  
5. Retrieve any type of information from a data base by formulating complex queries in SQL.  
6. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database. |
| 47. 18CSU414A | HTML Programming – Practical          | 1. Understand the fundamentals of HTML and use different formatting options  
2. Create tables and frames  
3. Insert a graphic and links within a web page.  
4. Insert ordered and unordered lists within a web page.  
5. Use cascading style sheets.  
6. Validate and publish a web page. |
| 48. 18CSU414B | XML Programming – Practical           | 1. Learning rules and techniques to create well-formed XML documents, learning to use XML namespaces correctly. |
2. Constructing Document Type Definitions and XML Schema documents that can be used to validate XML documents (structure, content).
3. Developing dynamic web pages using XSL, applying XSLT transformations and formatting to XML documents (XSL, XPath).
4. Creating valid HTML webpages and Cascading Style Sheets, based on the specifications of W3C.
5. Learning to display XML documents using CSS.
6. Construction of complex queries over XML documents using XPath and XQuery.

49. 19LSU101 Language – I
1. உள்ளிட்டுப்பாடலும் நூற்றாண்டு நேராடுகையும் விளைந்தது, நூற்றாண்டு பாத்திரக் கோளில் சிறப்பு நேராடுகையும் விளைந்தது அதிகமான பாதுகாப்புகள்
2. கூட்டும் வரையறுக்கம் மற்றும் நூற்றாண்டு வரையறுக்கம் பொருட்களை அலகுச்சேர்த்துகளை நடத்தும்
3. அழுத்தம் மற்றும் நூற்றாண்டு வரையறுக்கம், சிறைசெதியக்கலன் அடையும்
4. நூற்றாண்டு மற்றும் சிறைசெதியக்கலன் அளிக்கிறது “சிறைசெதியக்கலன்” அதிகமான பல்கிறக்காக அழுத்தம் சிறைசெதியக்கலன் நடத்தும்
5. சிறைசெதியக்கலன் കൃത്യതയുള്ള ചെയ്തതാൽ, 
6. பல்கிறக்காக அழுத்தம் 
7. சிறைசெதியக்கலன் ഈ പல்கிறக்கா ചെയ്ത പல்கிறக்கா 
8. சிறைசெதியக்கலன் 

50. 19CSU101 Programming Fundamentals using C / C++
1. Develop programs using the basic elements like control statements, Arrays and Strings.
2. understand about the dynamic memory allocation using pointers which is essential for utilizing memory
3. Understand about the code reusability with the help of user defined functions.
4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.
5. Use the characteristics of an object-oriented programming language in a program.
6. Use the basic object-oriented design principles in computer problem solving.

51. 19CSU102 Computer System Architecture
1. Students will acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.
2. Understand the inner workings and performance capabilities of advanced microprocessors.
3. Solve the problems using Boolean algebra
4. Understand the basic computer organization and design.
5. learn about Cache memory and its importance
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<th>Course Code</th>
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<th>Objectives</th>
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<tbody>
<tr>
<td>19CSU103</td>
<td>Computer Fundamentals</td>
<td>6. Solve the binary arithmetic problems and conversion among the number systems</td>
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<tr>
<td>1. Understand the meaning and basic components of a computer system, 2. Gain knowledge about five generations and classification of computer system, 3. Explain the functions of a computer, 4. Identify and discuss the functional units of a computer system, 5. Identify the various input and output units and explain their purposes, 6. Understand the emerging technologies and their uses.</td>
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<tr>
<td>19CSU111</td>
<td>Programming Fundamentals using C / C++ - Practical</td>
<td>1. Develop programs using the basic elements like control statements, Arrays and Strings. 2. understand about the dynamic memory allocation using pointers which is essential for utilizing memory 3. Understand about the code reusability with the help of user defined functions. 4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems. 5. Use the characteristics of an object-oriented programming language in a program. 6. Use the basic object-oriented design principles in computer problem solving.</td>
</tr>
<tr>
<td>19CSU112</td>
<td>Computer System Architecture - Practical</td>
<td>1. Students will acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills. 2. Understand the inner workings and performance capabilities of advanced microprocessors. 3. Solve the problems using Boolean algebra 4. Understand the basic computer organization and design. 5. learn about Cache memory and its importance 6. Solve the binary arithmetic problems and conversion among the number systems</td>
</tr>
<tr>
<td>19CSU113</td>
<td>Computer Fundamentals - Practical</td>
<td>1. Modify text using various formatting options from the editing tools under the Home tab 2. Set up section breaks to create different headers and footers for the odd and even pages within the document sections. 3. Demonstrate the mechanics and uses of Word tables to organize and present data. 4. Demonstrate working knowledge of using Word’s themes and clip art to create a variety of visual effects. 5. Create and design a spreadsheet for general office use. 6. Demonstrate the use of basic functions and formulas in Excel</td>
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<tr>
<td>19AEC101</td>
<td>Environmental Studies</td>
<td>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving. 2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.</td>
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</table>
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

57. 19LSU201 Language – II
1. வேண்டிய விளக்கங்களை விளக்க வேண்டும் கதாபெருக்கங்கள். விளக்கங்கள் பல்வேறு தேடும் வழிகளில் விளக்கம் செய்யலாம்.
2. வேண்டியால், குறுக்கூறுகளைப் பெற்று நூற்றுகளை மாற்றுகூறலை அள்ளுனரியலாம்.
3. அறிவு பெறுவதற்கு வேண்டும் பன்னாட்டுத் தொடர்பு.
4. வழிகோடுகள் முன்னுரிமையை காட்டுவதற்கு. அரசியல் வழிகோடுகள் தேடும் வழிகோடுகளின் அடர்த்தி என்று காட்டுதலை பெற்றது.
5. வல்லும் வழிகோடுகள் குறிப்பிடுவதற்கு. பொன்னும் பார்ப்புகளை பெற்று முடிக்கும்.
6. நூற்றுகள் மற்றும் அள்ளுனரியல் பொருளியல் முன்னுரிமைகள்.

58. 19ENU201 English
1. Develop the knowledge of interpersonal skills.
2. Establish and maintain social relationships.
3. Genres of literature will give moral values of life.
4. Develop communication skills in business environment.
5. Communication skills will get developed.
6. Develop to have language competence.

59. 19CSU201 Programming in JAVA
1. Student will obtain knowledge of the structure and model of the Java programming language.
2. How to use the Java programming language for various programming technologies (understanding).
3. Develop software in the Java programming language (application).
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis).
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation).
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 60. 19CSU202 | Discrete Structures                       | 1. Familiar with elementary algebraic set theory.  
2. Acquire a fundamental understanding of the core concepts in growth of functions.  
3. Describe the method of recurrence relations.  
4. Get wide knowledge about graphs and trees  
5. Initiate to knowledge from inference theory  
6. Solve problems with the help of tools of mathematical analysis. |
| 61. 19CSU203 | Computer Networks and Internet Technologies | 1. Independently understand basic computer network technology.  
2. Understand and explain Data Communications System and its components.  
3. Identify the different types of network topologies and protocols.  
4. Enumerate the layers of the OSI model and TCP/IP.  
5. Gain the skills and project-based experience needed for entry into web design and development careers.  
6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages. |
| 62. 19CSU211 | Programming in JAVA - Practical           | 1. Student will obtain knowledge of the structure and model of the Java programming language.  
2. How to use the Java programming language for various programming technologies (understanding)  
3. Develop software in the Java programming language (application)  
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)  
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)  
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation) |
| 63. 19CSU212 | Discrete Structures - Practical           | On successful completion of the course, students will be able to  
1. Familiar with elementary algebraic set theory.  
2. Acquire a fundamental understanding of the core concepts in growth of functions.  
3. Describe the method of recurrence relations.  
4. Get wide knowledge about graphs and trees  
5. Initiate to knowledge from inference theory  
6. Solve problems with the help of tools of mathematical analysis. |
| 64. 19CSU213 | Computer Networks and Internet Technologies - Practical | 1. Independently understand basic computer network technology.  
2. Understand and explain Data Communications System and its components.  
3. Identify the different types of network topologies and protocols.  
4. Enumerate the layers of the OSI model and TCP/IP.  
5. Gain the skills and project-based experience needed for entry into web design and development careers.  
6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages. |
**Name of the Department:** Computer Science

**Course:** B.Sc. Information Technology

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1.      | 17ITU501A   | Computer Graphics  | After the completion of this course, a successful student will be able to:  
1. List the basic concepts used in computer graphics.  
2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.  
3. Describe the importance of viewing and projections.  
4. Define the fundamentals of animation, virtual reality and its related technologies,  
5. Understand a typical graphics pipeline  
6. Design an application with the principles of virtual reality |
| 2.      | 17ITU501B   | Software Testing   | After the completion of this course, a successful student will be able to:  
1. Grasp the fundamentals of a programming language and know the basic differences between programming languages  
2. Choose the architecture based on the problem to be solved.  
3. Differentiate between the types of applications supported by .Net  
4. Build, compile and execute a VB .Net program  
5. Apply techniques to develop error-free software  
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts |
| 3.      | 17ITU502A   | .NET Programming   | After the completion of this course, a successful student will be able to:  
1. Grasp the fundamentals of a programming language and know the basic differences between programming languages  
2. Choose the architecture based on the problem to be solved.  
3. Differentiate between the types of applications supported by .Net  
4. Build, compile and execute a VB .Net program  
5. Apply techniques to develop error-free software  
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts |
| 4.      | 17ITU502B   | Network Programming| After the completion of this course, a successful student will be able to:  
1. Analyze the various transmission media, their comparative study, fiber optics and wireless media  
2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites. |
3. TCP, UDP, SCTP protocols Ethernet and LAN administration.
4. Details of IP operations in the INTERNET and associated routing principles
5. Understand the key protocols which support the Internet
6. Create applications using techniques such as multiplexing, forking, multithreading

5. **17ITU503A** Machine Learning

After the completion of this course, a successful student will be able to:
1. Have a broad understanding of machine learning algorithms and their use in data-driven knowledge discovery and program synthesis.
2. Design and implement several machine learning algorithms in Java.
3. Identify, formulate and solve machine learning problems that arise in practical applications.
4. Have knowledge of the strengths and weaknesses of different machine learning algorithms (relative to the characteristics of the application domain) and be able to adapt or combine some of the key elements of existing machine learning algorithms to design new algorithms as needed.
5. Identify machine learning techniques suitable for a given problem
6. Solve the problems using various machine learning techniques

6. **17ITU503B** Data Mining

After the completion of this course, a successful student will be able to:
1. Introduce students to the basic concepts and techniques of Data Mining.
2. Develop skills of using recent data mining software for solving practical problems.
3. Gain experience of doing independent study and research.
4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning
5. Identify appropriate data mining algorithms to solve real world problems
6. Benefit the user experiences towards research and innovation. integration

7. **17ITU504A** Digital Image Processing

Upon completion of this course, the students will be able to:
1. Review the fundamental concepts of a digital image processing system.
2. Analyze images in the frequency domain using various transforms.
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.
5. Interpret Image compression standards.
6. Interpret image segmentation and representation techniques.

8. **17ITU504B** Multimedia and its Applications

Upon successful completion the student will be able to:
1. Define multimedia to potential clients.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>After the completion of this course, a successful student will be able to:</th>
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</thead>
</table>
| 9. 17ITU511A | Computer Graphics - Practical | 1. List the basic concepts used in computer graphics.  
2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.  
3. Describe the importance of viewing and projections.  
4. Define the fundamentals of animation, virtual reality and its related technologies,  
5. Understand a typical graphics pipeline  
6. Design an application with the principles of virtual reality                                                                                           |
| 10. 17ITU511B | Software Testing - Practical   | 1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.  
2. Work effectively as leader/member of a development team to deliver quality software artifacts.  
3. Analyze, specify and document software requirements for a software system.  
4. Verify, validate, assess and assure the quality of software artifacts.  
5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.  
6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment. |
| 11. 17ITU512A | .NET Programming - Practical  | 1. Grasp the fundamentals of a programming language and know the basic differences between programming languages  
2. Choose the architecture based on the problem to be solved.  
3. Differentiate between the types of applications supported by .Net  
4. Build, compile and execute a VB .Net program  
5. Apply techniques to develop error-free software  
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Requirements</th>
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</thead>
<tbody>
<tr>
<td>12. 17ITU512B</td>
<td>Network Programming - Practical</td>
<td>After the completion of this course, a successful student will be able to: 1. Analyze the various transmission media, their comparative study, fiber optics and wireless media 2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites. 3. TCP, UDP, SCTP protocols Ethernet and LAN administration. 4. Details of IP operations in the INTERNET and associated routing principles 5. Understand the key protocols which support the Internet. 6. Create applications using techniques such as multiplexing, forking, multithreading</td>
</tr>
<tr>
<td>13. 17ITU513A</td>
<td>Machine Learning - Practical</td>
<td>After the completion of this course, a successful student will be able to: 1. Have a broad understanding of machine learning algorithms and their use in data-driven knowledge discovery and program synthesis. 2. Design and implement several machine learning algorithms in Java. 3. Identify, formulate and solve machine learning problems that arise in practical applications. 4. Have knowledge of the strengths and weaknesses of different machine learning algorithms (relative to the characteristics of the application domain) and be able to adapt or combine some of the key elements of existing machine learning algorithms to design new algorithms as needed. 5. Identify machine learning techniques suitable for a given problem 6. Solve the problems using various machine learning techniques</td>
</tr>
<tr>
<td>14. 17ITU513B</td>
<td>Data Mining - Practical</td>
<td>After the completion of this course, a successful student will be able to: 1. Introduce students to the basic concepts and techniques of Data Mining. 2. Develop skills of using recent data mining software for solving practical problems. 3. Gain experience of doing independent study and research. 4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning 5. Identify appropriate data mining algorithms to solve real world problems 6. Benefit the user experiences towards research and innovation. integration</td>
</tr>
<tr>
<td>15. 17ITU514A</td>
<td>Digital Image Processing - Practical</td>
<td>Upon completion of this course, the students will be able to: 1. Review the fundamental concepts of a digital image processing system.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Upon successful completion the student will be able to:</td>
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</table>
2. Identify and describe the function of the general skill sets in the multimedia industry.  
3. Identify the basic components of a multimedia project.  
4. Identify the basic hardware and software requirements for multimedia development and playback.  
5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).  
6. Use appropriate tools for the design, development and creation of digital media artefacts. |
| 17. 17ITU601A | PHP Programming               | Upon completion of this course, the students will be able to  
1. Write PHP scripts to handle HTML forms.  
2. Write regular expressions including modifiers, operators, and metacharacters.  
3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.  
4. Analyze and solve various database tasks using the PHP language.  
5. Analyze and solve common Web application tasks by writing PHP programs  
6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website. |
| 18. 17ITU601B | Unix / Linux Programming      | Upon completion of this course, the students will be able to  
1. Develop software for Linux/UNIX systems.  
2. Learn the C language and get experience programming in C.  
3. Learn the important Linux/UNIX library functions and system calls.  
4. Understand the inner workings of UNIX-like operating systems.  
5. Obtain a foundation for an advanced course in operating systems.  
6. Construct various shell scripts for simple applications |
| 19. 17ITU602A | E-Commerce Technologies       | Upon successful completion of this course, the student will be able to:  
1. Describe an example of system architecture for an e-Business.  
2. List the seven major elements of web design.  
3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.  
4. Identify the major electronic payment issues and options. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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<td>5.</td>
<td>Discuss security issues and</td>
<td>5. Discuss security issues and explain procedures used to protect against security threats.</td>
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<td>explain procedures used to</td>
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<td>protect against security</td>
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<td>threats.</td>
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<td>6.</td>
<td>Identify and discuss</td>
<td>6. Identify and discuss management issues underlying e-Commerce issues including</td>
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<td>management issues</td>
<td>organizational structure, strategic planning, goal setting, corporate social</td>
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<td>underlying e-Commerce issues</td>
<td>responsibility, international arena, changing market intermediaries, resource</td>
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<td>including organizational</td>
<td>allocation and customer service.</td>
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<td>structure, strategic planning</td>
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<td>goal setting, corporate</td>
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<td>social responsibility,</td>
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<td>international arena,</td>
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<td>changing market</td>
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<td>intermediaries, resource</td>
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<td>allocation and customer</td>
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<td>service.</td>
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<td>20.</td>
<td>17ITU602B Cloud Computing</td>
<td>Upon completion of this course, the students will be able to</td>
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<td></td>
<td>1. Analyze the Cloud computing setup with its vulnerabilities and applications</td>
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<td>using different architectures.</td>
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<td>2. Design different workflows according to requirements and apply map reduce</td>
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<td></td>
<td>programming model.</td>
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<td>3. Apply and design suitable Virtualization concept, Cloud Resource Management</td>
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<td>and design scheduling algorithms.</td>
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<td>4. CO4: Create combinatorial auctions for cloud resources and design scheduling</td>
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<td>algorithms for computing clouds.</td>
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<td>5. Assess cloud Storage systems and Cloud security, the risks involved, its impact</td>
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<td>and develop cloud application.</td>
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<td>6. Broadly educate to know the impact of engineering on legal and societal issues</td>
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<td>involved in addressing the security issues of cloud computing.</td>
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<td>21.</td>
<td>17ITU603A Numerical Methods</td>
<td>On completion of the course students will be able to</td>
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<td></td>
<td>1. Apply Numerical analysis which has enormous application in the field of Science</td>
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<td>2. Familiar with numerical integration and differentiation, numerical solution of</td>
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<td>ordinary differential equations.</td>
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<td>3. Familiar with calculation and interpretation of errors in numerical method.</td>
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<td>4. Develop and apply the appropriate numerical techniques for the problem,</td>
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<td>interpret the results, and assess accuracy.</td>
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<td>5. Understand the basics of Numerical Differentiation &amp; Integration and numerical</td>
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<td>solutions of ordinary differential equations.</td>
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<td>6. Understand the concepts of difference operators and the use of Interpolation.</td>
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<td>22.</td>
<td>17ITU603B System Programming</td>
<td>Upon completion of the subject, students will be able to</td>
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<td>1. Organize the functionalities and components of a computer system into different</td>
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<td>layers, and have a good understanding of the role of system programming and the</td>
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<td>scope of duties and tasks of a system programmer</td>
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<td>2. Grasp the concepts and principles, and be familiar with the approaches and</td>
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<td>methods of developing system-level software (e.g., compiler, and networking</td>
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<td>software)</td>
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<td>3. Apply the knowledge and techniques learnt to develop solutions to real world</td>
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<td>problems</td>
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<td>4. Select and make use of the OS kernel functions and their APIs, standard</td>
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<td>programming languages, and utility tools</td>
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<td>5. Organize and manage software built for deployment and demonstration.</td>
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<td>6. Analyze requirements and solve problems using systematic planning and</td>
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<td>development approaches</td>
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<td>Course Code</td>
<td>Course Name</td>
<td>Description</td>
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<tr>
<td>23. 17ITU611A</td>
<td>PHP Programming - Practical</td>
<td>Upon completion of this course, the students will be able to: 1. Write PHP scripts to handle HTML forms. 2. Write regular expressions including modifiers, operators, and metacharacters. 3. Create PHP programs that use various PHP library functions, and that manipulate files and directories. 4. Analyze and solve various database tasks using the PHP language. 5. Analyze and solve common Web application tasks by writing PHP programs. 6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website.</td>
</tr>
<tr>
<td>24. 17ITU611B</td>
<td>Unix / Linux Programming - Practical</td>
<td>Upon completion of this course, the students will be able to: 1. Develop software for Linux/UNIX systems. 2. Learn the C language and get experience programming in C. 3. Learn the important Linux/UNIX library functions and system calls. 4. Understand the inner workings of UNIX-like operating systems. 5. Obtain a foundation for an advanced course in operating systems. 6. Construct various shell scripts for simple applications.</td>
</tr>
<tr>
<td>25. 17ITU612A</td>
<td>E-Commerce Technologies - Practical</td>
<td>Upon successful completion of this course, the student will be able to: 1. Describe an example of system architecture for an e-Business. 2. List the seven major elements of web design. 3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools. 4. Identify the major electronic payment issues and options. 5. Discuss security issues and explain procedures used to protect against security threats. 6. Identify and discuss management issues underlying e-Commerce issues including organizational structure, strategic planning, goal setting, corporate social responsibility, international arena, changing market intermediaries, resource allocation and customer service.</td>
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<tr>
<td>26. 17ITU612B</td>
<td>Cloud Computing – Practical</td>
<td>Upon completion of this course, the students will be able to: 1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures. 2. Design different workflows according to requirements and apply map reduce programming model. 3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms. 4. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds. 5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.</td>
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</table>
6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

| 27. | 17ITU613A | Numerical Methods - Practical | Upon completion of this course, the students will be able to
1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
2. Apply numerical methods to obtain approximate solutions to mathematical problems.
3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
4. Analyse and evaluate the accuracy of common numerical methods.
5. Implement numerical methods in MATLAB.
6. Write efficient, well-documented MATLAB code and present numerical results in an informative way. |

| 28. | 17ITU613B | System Programming - Practical | Upon completion of the subject, students will be able to
1. Organize the functionalities and components of a computer system into different layers, and have a good understanding of the role of system programming and the scope of duties and tasks of a system programmer
2. Grasp the concepts and principles, and be familiar with the approaches and methods of developing system-level software (e.g., compiler, and networking software)
3. Apply the knowledge and techniques learnt to develop solutions to real world problems
4. Select and make use of the OS kernel functions and their APIs, standard programming languages, and utility tools
5. Organize and manage software built for deployment and demonstration.
6. Analyze requirements and solve problems using systematic planning and development approaches |

| 29. | 18ITU301 | Data Structures | After the completion of this course, a successful student will be able to:
1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Identify different parameters to analyze the performance of an algorithm.
4. Apply concepts learned in various domains like DBMS, compiler construction etc.
5. Use linear and non-linear data structures like stacks, queues, linked list etc.
6. Illustrate various technique to for searching, Sorting and hashing |

| 30. | 18ITU302 | Operating Systems | After the completion of this course, a successful student will be able to:
1. Describe the important computer system resources and the |
<table>
<thead>
<tr>
<th>31.</th>
<th>18ITU303</th>
<th>Relational Database Management Systems</th>
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<td>Upon completion of the course, students will be able to</td>
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<tr>
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<td></td>
<td>1. Explain the features of database management systems and Relational database.</td>
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<td>2. Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra.</td>
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<td></td>
<td>3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.</td>
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<td></td>
<td>4. Retrieve any type of information from a database by formulating complex queries in SQL.</td>
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<td>5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</td>
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<td></td>
<td>6. Build indexing mechanisms for efficient retrieval of information from a database</td>
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<table>
<thead>
<tr>
<th>32.</th>
<th>18ITU304A</th>
<th>Android Programming</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Upon completion of this course, the students will able to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Describe Android platform, Architecture and features.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Use Internet, Broadcast receivers and Internet services in Android App.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Design and implement Database Application and Content providers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Use multimedia, camera and Location based services in Android App.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Discuss various security issues in Android platform</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>33.</th>
<th>18ITU304B</th>
<th>Programming in Python</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Upon completion of the course, students will be able to</td>
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<tr>
<td></td>
<td></td>
<td>1. Develop algorithmic solutions to simple computational problems</td>
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<tr>
<td></td>
<td></td>
<td>2. Read, write, execute by hand simple Python programs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Decompose a Python program into functions.</td>
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<tr>
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<td></td>
<td>5. Represent compound data using Python lists, tuples, dictionaries.</td>
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<td></td>
<td>6. Read and write data from/to files in Python Programs.</td>
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<thead>
<tr>
<th>34.</th>
<th>18ITU311</th>
<th>Data Structures – Practical</th>
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<tbody>
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<td></td>
<td></td>
<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td></td>
<td>1. Choose appropriate data structure as applied to specified problem definition.</td>
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<td>2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.</td>
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<td>3. Identify different parameters to analyze the performance of an algorithm.</td>
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<td>Course Code</td>
<td>Course Title</td>
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</tbody>
</table>
| 35. 18ITU312 | Operating Systems – Practical | 4. Apply concepts learned in various domains like DBMS, compiler construction etc.  
5. Use linear and non-linear data structures like stacks, queues, linked list etc.  
6. Illustrate various technique to for searching, Sorting and hashing  

After the completion of this course, a successful student will be able to:  
1. Describe the important computer system resources and the  
2. Perform the role of operating system in their management policies and algorithms.  
3. Understand the process management policies and scheduling of processes by CPU  
4. Evaluate the requirement for process synchronization and coordination handled by operating system  
5. Describe and analyze the memory management and its allocation policies.  
6. Identify, use and evaluate the storage management policies with respect to different storage management technologies, identify the need to create the special purpose operating system. |

| 36. 18ITU313 | RDBMS – Practical | Upon completion of the course, students will be able to  
1. Explain the features of database management systems and Relational database.  
2. Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra.  
3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.  
4. Retrieve any type of information from a data base by formulating complex queries in SQL.  
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.  
6. Build indexing mechanisms for efficient retrieval of information from a database |

| 37. 18ITU314A | Android Programming – Practical | Upon completion of this course, the students will able to  
1. Describe Android platform, Architecture and features.  
3. Use Internet, Broadcast receivers and Internet services in Android App.  
4. Design and implement Database Application and Content providers.  
5. Use multimedia, camera and Location based services in Android App.  
6. Discuss various security issues in Android platform |

| 38. 18ITU314B | Programming in Python – Practical | Upon completion of the course, students will be able to  
1. Develop algorithmic solutions to simple computational problems  
2. Read, write, execute by hand simple Python programs.  
4. Decompose a Python program into functions. |
<p>| | | | |</p>
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<tr>
<td>5.</td>
<td>Represent compound data using Python lists, tuples, dictionaries.</td>
<td>6.</td>
<td>Read and write data from/to files in Python Programs.</td>
</tr>
<tr>
<td>39.</td>
<td><strong>18ITU401</strong></td>
<td><strong>Data Communication and Networks</strong></td>
<td>Upon completion of the course, students will be able to:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1. Describe the functions of each layer in OSI and TCP/IP model.</td>
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<td>2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.</td>
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<td>3. Describe the Session layer design issues and Transport layer services.</td>
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<td>4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.</td>
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<td>5. Describe the functions of data link layer and explain the protocols.</td>
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<td></td>
<td>6. Explain the types of transmission media with real time applications.</td>
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<tr>
<td>40.</td>
<td><strong>18ITU402</strong></td>
<td><strong>Software Engineering</strong></td>
<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</td>
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<td></td>
<td>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</td>
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<td>3. Analyze, specify and document software requirements for a software system.</td>
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<td>4. Verify, validate, assess and assure the quality of software artifacts.</td>
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<td></td>
<td>5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its Course Objectives and risks, and estimate its cost and time.</td>
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<td></td>
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<td></td>
<td>6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.</td>
</tr>
<tr>
<td>41.</td>
<td><strong>18ITU403</strong></td>
<td><strong>Programming in PERL</strong></td>
<td>After the completion of this course, a successful student will be able to:</td>
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<td></td>
<td></td>
<td>1. Focus on new type of programming methods</td>
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<td></td>
<td>2. Analyze the ease of the language with other languages</td>
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<td></td>
<td>3. Familiar with implementation of CGI</td>
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<td>4. Interpret the mathematical results in physical and other forms.</td>
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<td>5. Identify, formulate and solve the Linear Differential Equations.</td>
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<td>6. Classify and solve the contour integration of complex functions.</td>
</tr>
<tr>
<td>42.</td>
<td><strong>18ITU404A</strong></td>
<td><strong>Scripting Language</strong></td>
<td>At the end of the course, the student should be able to:</td>
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<td></td>
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<td></td>
<td>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</td>
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<td>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</td>
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<td></td>
<td>3. Use the JavaScript to develop the dynamic web pages.</td>
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<tr>
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<td></td>
<td>4. Use server side scripting with JSP to generate the web pages dynamically.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Course Description</td>
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</table>
| 18ITU404B   | XML Programming | After the completion of this course, a successful student will be able to:  
1. Create a new webpage  
2. Understand the fundamental features of web applications.  
3. Understand the objects and components needed for a web designing.  
4. Understand the current industry support for XML technologies.  
5. Sharpen the students’ practical development skills via focused assignments and projects.  
6. Understand what is XML and how to parse and use XML Data. |
| 18ITU411    | Data Communication and Networks - Practical | After the completion of this course, a successful student will be able to:  
1. Describe the functions of each layer in OSI and TCP/IP model.  
2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.  
3. Describe the Session layer design issues and Transport layer services.  
4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.  
5. Describe the functions of data link layer and explain the protocols.  
6. Explain the types of transmission media with real time applications. |
| 18ITU412    | Software Engineering - Practical | After the completion of this course, a successful student will be able to:  
1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.  
2. Work effectively as leader/member of a development team to deliver quality software artifacts.  
3. Implement a given software design using sound development practices.  
4. Verify, validate, assess and assure the quality of software artifacts.  
5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.  
6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment. |
| 18ITU413    | Programming in PERL - Practical | After the completion of this course, a successful student will be able to:  
1. Focus on new type of programming methods  
2. Analyse the ease of the language with other languages  
3. Familiar with implementation of CGI. |
<table>
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<tr>
<th>No.</th>
<th>Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>47</td>
<td>18ITU414A</td>
<td>Scripting Language - Practical</td>
<td>At the end of the course, the student should be able to:</td>
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<tr>
<td></td>
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<td></td>
<td>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</td>
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<tr>
<td></td>
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<td></td>
<td>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</td>
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<td>3. Use the JavaScript to develop the dynamic web pages.</td>
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<td>4. Use server side scripting with JSP to generate the web pages dynamically.</td>
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<td>5. Gain knowledge of client side scripting, validation of forms and AJAX programming.</td>
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<td>6. Create applications by using the concepts like JSP and Servlet.</td>
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<tr>
<td>48</td>
<td>18ITU414B</td>
<td>XML Programming - Practical</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<td></td>
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<td>1. Create a new webpage</td>
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<td>5. Sharpen the students’ practical development skills via focused assignments and projects.</td>
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<td></td>
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<td></td>
<td>6. Understand what is XML and how to parse and use XML.</td>
</tr>
<tr>
<td>49</td>
<td>19LSU101</td>
<td>Language – I</td>
<td>1. சேருந்தியுடன் பாபற்றப் பிரிட்டார்க பொருள்பாருக்கள் கொள்ளத்தக்கர், சிறுமியர் பாபற்றப் பிரிட்டார்க்கள் கொள்ளத் தக்கர். பயிற்சிகள் கையில் இருந்து பயிற்சிகள் கையில் இருந்து.</td>
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<td>2. கூற்றும் பட்டியல், புதுக்கோரையில் மூன்று செய்திகளில் காரணங்கள் கூறும் செய்திகள் செய்திகளுக்கு பயிற்சிகள் பயிற்சிகள் கையில் இருந்து பயிற்சிகள் கையில் இருந்து.</td>
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<td>3. சூட்டுத் பபருக்கு தெற்கவரிய், ‘அறிவியல் தொன்,’ ‘தொன் பபருக்கு’ சூட்டுத் பபருக்கு அறிவியல் தொன் பபருக்கு தொன் பபருக்கு.</td>
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<td>4. செய்யனர் பபர்க்கு கையில் இருந்து பயிற்சிகள் பயிற்சிகள் கையில் இருந்து பயிற்சிகள் கையில் இருந்து.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Requirements</td>
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<tr>
<td>50. 19ITU101</td>
<td>Programming Fundamentals using C / C++</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<td></td>
<td>1. Obtain the knowledge about the number systems this will be very useful for</td>
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<td></td>
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<td>bitwise operations.</td>
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<td></td>
<td>2. Develop programs using the basic elements like control statements,</td>
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<td></td>
<td></td>
<td>Arrays and Strings.</td>
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<td>3. Understand about the dynamic memory allocation using pointers which is</td>
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<td>essential for utilizing memory.</td>
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<td>4. Understand about the code reusability with the help of user defined</td>
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<td></td>
<td></td>
<td>functions.</td>
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<td>5. Develop advanced applications using enumerated data types, function</td>
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<td></td>
<td>pointers and nested structures, the basic object-oriented design</td>
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<td></td>
<td>principles in computer problem solving.</td>
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<td>6. Learn the basics of file handling mechanism that is essential for</td>
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<td>understanding the concepts in database management systems, the uses of</td>
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<td>pre-processors and various header file directives, the characteristics of</td>
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<td></td>
<td>an object-oriented programming language in a program.</td>
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<tr>
<td>51. 19ITU102</td>
<td>Computer System Architecture</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td></td>
<td>1. Acquire a basic knowledge about computer system architecture, digital</td>
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<td>circuits and the low - level programming skills.</td>
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<td>2. Understand the inner workings and performance capabilities of advanced</td>
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<td>microprocessors.</td>
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<td>3. Solve the problems using Boolean algebra</td>
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<td>4. Understand the basic computer organization and design.</td>
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<td>5. Learn about Cache memory and its importance</td>
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<td>6. Solve the binary arithmetic problems and conversion among the number</td>
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<td></td>
<td></td>
<td>systems.</td>
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<tr>
<td>52. 19ITU103</td>
<td>Computer Fundamentals</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td></td>
<td>1. Understand the meaning and basic components of a computer system,</td>
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<td></td>
<td>2. Define and distinguish Hardware and Software components of computer</td>
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<td></td>
<td></td>
<td>system,</td>
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<td>3. Explain and identify different computing machines during the evolution</td>
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<td>of computer system, gain knowledge about five generations of computer</td>
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<td></td>
<td>system,</td>
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<td>4. Identify and discuss the functional Units of a computer system,</td>
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<td>identify the various input and output Units and explain their purposes.</td>
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<td>5. Understand the role of CPU and its components, understand the concept</td>
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<td>and need of primary and secondary memory, discuss the advantages,</td>
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<td>limitations and applications of computers.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>After completion of this course, a successful student will be able to:</td>
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<td>6. Understand the classification of computers, distinguish the computers on the basis of purpose, technology and size</td>
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<tr>
<td>53.</td>
<td>19ITU111 Programming Fundamentals using C / C++</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td>Practical</td>
<td>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.</td>
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<td>2. Develop programs using the basic elements like control statements, Arrays and Strings.</td>
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<td>3. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory</td>
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<td>4. Understand about the code reusability with the help of user defined functions.</td>
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<td>5. Develop advanced applications using enumerated data types, function pointers and nested structures, the basic object-oriented design principles in computer problem solving.</td>
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<td>6. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems, the uses of pre-processors and various header file directives, the characteristics of an object-oriented programming language in a program.</td>
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<tr>
<td>54.</td>
<td>19ITU112 Computer System Architecture – Practical</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td></td>
<td>1. Acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</td>
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<td>2. Understand the inner workings and performance capabilities of advanced microprocessors.</td>
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<td>3. Solve the problems using Boolean algebra</td>
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<td>4. Understand the basic computer organization and design.</td>
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<td>5. Learn about Cache memory and its importance.</td>
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<td>6. Solve the binary arithmetic problems and conversion among the number systems</td>
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<tr>
<td>55.</td>
<td>19ITU113 Computer Fundamentals - Practical</td>
<td>After completion of this course, the students will be able to:</td>
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<td></td>
<td></td>
<td>1. Modify text using various formatting options from the editing tools under the Home tab, Set up section breaks to create different headers and footers for the odd and even pages within the document sections.</td>
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<td>2. Demonstrate the mechanics and uses of Word tables to organize and present data, Demonstrate working knowledge of using Word's themes and clip art to create a variety of visual effects.</td>
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<td>3. Demonstrate working knowledge of Word’s advanced formatting techniques and presentation styles, Demonstrate applicable knowledge and uses of accepted business style formatting conventions.</td>
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<td>4. Demonstrate working knowledge of Word’s advanced formatting techniques and presentation styles, Demonstrate applicable knowledge and uses of accepted business style formatting conventions.</td>
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<td>5. Create and design a spreadsheet for general office use, demonstrate the basic mechanics and navigation of an Excel spreadsheet.</td>
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<td>6. Demonstrate formatting techniques and presentation styles, demonstrate the use of basic functions and formulas</td>
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<td>Page</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Learning Outcomes</td>
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<td>--------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 56.  | 19AEC101    | Environmental Studies                             | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. |
| 57.  | 19LSU201    | Language – II                                     | 1. கல்வியுடன் குறிப்பிட்டல் பல்லியை மீண்டுச் செய்தலும். குறிப்பிட்டல் பல்லியை மீண்டுச் செய்தலாக. 'சின்ன நிலையும்' தொடுது நேர்நர் செயலான அமைப்புகள் பார்வைத்துக்காட்டும்.  
2. கல்வியுடன், குறிப்பிட்டல் பல்லியை மீண்டுச் செய்தலும். குறிப்பிட்டல் பல்லியை மீண்டுச் செய்தலாக. குறிப்பிட்டல் பல்லியை மீண்டுச் செய்தலாக.  
3. குறிப்பிட்டல் பல்லியை குறிப்பிட்டல். 'அமைப்புகள் குறிப்பிட்டல்'; 'சின்னவு பல்லி' தொடுது நேர்நர் செயலான அமைப்புகளை நேர்நர் செயலான அமைப்புகளை.  
4. வகைப்பாட்டுப்புரிந்து குறிப்பிட்டல் வருவது வருவது. பல்லியை மீண்டுச் செய்தலும் பார்வைத்துக்காட்டும்.  
5. தொடுது நேர்நர் செயலான அமைப்புகளை மீண்டுச் செய்தல் குறிப்பிட்டல் சின்னவுப்பாட்டு நேர்நர் செயலான அமைப்புகளை.  
6. பல்லியை மீண்டுச் செய்தலும். வகைப்பாட்டுப்புரிந்து சின்னவுப்பாட்டு சின்ன பார்வைத்துக்காட்டும். |
| 58.  | 19ENU201    | English                                           | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment  
5. Communication skills will get developed.  
6. Develop to have language competence. |
<p>| 59.  | 19ITU201    | Programming in JAVA                               | After completion of this course, the students will be able to |</p>
<table>
<thead>
<tr>
<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>60.</td>
<td>19ITU202</td>
<td>Discrete Structures</td>
<td>On successful completion of the course, students will be able to</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1. Familiar with elementary algebraic set theory.</td>
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<td>2. Acquire a fundamental understanding of the core concepts in growth of functions.</td>
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<td>3. Describe the method of recurrence relations.</td>
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<td>4. Get wide knowledge about graphs and trees</td>
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<td>5. Initiate to knowledge from inference theory</td>
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<td></td>
<td>6. Solve problems with the help of tools of mathematical analysis</td>
</tr>
<tr>
<td>61.</td>
<td>19ITU203</td>
<td>Computer Networks and Internet</td>
<td>After the completion of this course, a successful student will be able to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technologies</td>
<td>1. Independently understand basic computer network technology.</td>
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<td>2. Understand and explain Data Communications System and its components.</td>
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<td>3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP.</td>
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<td></td>
<td>4. Employ fundamental computer theory to basic programming techniques, gain the skills and project-based experience needed for entry into web design and development careers.</td>
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<td>5. Develop awareness and appreciation of the many ways that people access the web, and will be able to create standards-based websites that can be accessed by the full spectrum of web access technologies.</td>
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<td></td>
<td>6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages, create and manipulate web media objects using editing software.</td>
</tr>
<tr>
<td>62.</td>
<td>19ITU211</td>
<td>Programming in JAVA - Practical</td>
<td>After completion of this course, the students will be able to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practical</td>
<td>1. Obtain knowledge of the structure and model of the Java programming language.</td>
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<td>2. Use the Java programming language for various programming technologies (understanding)</td>
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<td>3. Develop software in the Java programming language (application)</td>
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</table>
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Use certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>63. 19ITU212</td>
<td>Discrete Structures - Practical</td>
<td>On successful completion of the course, students will be able to: 1. Familiar with elementary algebraic set theory. 2. Acquire a fundamental understanding of the core concepts in growth of functions. 3. Describe the method of recurrence relations. 4. Get wide knowledge about graphs and trees 5. Initiate to knowledge from inference theory 6. Solve problems with the help of tools of mathematical analysis</td>
</tr>
<tr>
<td>64. 19ITU213</td>
<td>Computer Networks and Internet Technologies Practical</td>
<td>After the completion of this course, a successful student will be able to: 1. Independently understand basic computer network technology. 2. Understand and explain Data Communications System and its components. 3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP. 4. Employ fundamental computer theory to basic programming techniques, gain the skills and project-based experience needed for entry into web design and development careers. 5. Develop awareness and appreciation of the many ways that people access the web, and will be able to create standards-based websites that can be accessed by the full spectrum of web access technologies 6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages, create and manipulate web media objects using editing software.</td>
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</table>
Name of the Department: **Computer Science**

**Course:** B.Sc. Computer Technology

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1       | 17CTU501A   | Cryptography and Network Security | After successful completion of the course, the learners would be able to:  
1. Illustrate various Public key cryptographic techniques  
2. Evaluate the authentication and hash algorithms  
3. Provide security of the data over the network.  
4. Do research in the emerging areas of cryptography and network security.  
5. Implement various networking protocols.  
6. Protect any network from the threats in the world |
| 2       | 17CTU501B   | Software Testing | After the completion of this course, a successful student will be able to:  
1. Grasp the fundamentals of a programming language and know the basic differences between programming languages  
2. Choose the architecture based on the problem to be solved.  
3. Differentiate between the types of applications supported by .Net  
4. Build, compile and execute a VB .Net program  
5. Apply techniques to develop error-free software.  
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts. |
| 3       | 17CTU502A   | .NET Programming | After the completion of this course, a successful student will be able to:  
1. Grasp the fundamentals of a programming language and know the basic differences between programming languages  
2. Choose the architecture based on the problem to be solved.  
3. Differentiate between the types of applications supported by .Net  
4. Build, compile and execute a VB .Net program  
5. Apply techniques to develop error-free software.  
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts. |
| 4       | 17CTU502B   | Network Programming | After the completion of this course, a successful student will be able to:  
1. Analyze the various transmission media, their comparative study, fibre optics and wireless media  
2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites.  
3. TCP, UDP, SCTP protocols Ethernet and LAN administration. |
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<td>5.</td>
<td>17CTU503A</td>
<td>Introduction to Data Science</td>
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</table>
|   |   | 4. Details of IP operations in the INTERNET and associated routing principles  
|   |   | 5. Understand the key protocols which support the Internet.  
|   |   | 6. Create applications using techniques such as multiplexing, forking, multithreading |
|   |   |   |
|   |   | After the completion of this course, a successful student will be able to:  
|   |   | 1. Understand the problems solvable with data science and an ability to attack them from a statistical perspective.  
|   |   | 2. Understand when to use supervised and unsupervised statistical learning methods on labelled and unlabelled data-rich problems.  
|   |   | 3. Create data analytical pipelines and applications in Python.  
|   |   | 4. Familiar data science ecosystem and the various tools needed to continue developing as a data scientist.  
|   |   | 5. Develop the mindset to work like a data scientist, and follow a methodology to tackle different types of data science problems.  
|   |   | 6. Describe what data science and machine learning are, their applications & use cases, and various types of tasks performed by data scientists |
|   |   |   |
| 6. | 17CTU503B | Data Mining |
|   |   |   |
|   |   | After the completion of this course, a successful student will be able to:  
|   |   | 1. Introduce students to the basic concepts and techniques of Data Mining.  
|   |   | 2. Develop skills of using recent data mining software for solving practical problems.  
|   |   | 3. Gain experience of doing independent study and research.  
|   |   | 4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning  
|   |   | 5. Identify appropriate data mining algorithms to solve real world problems.  
|   |   | 6. Benefit the user experiences towards research and innovation. integration |
|   |   |   |
| 7. | 17CTU504A | Digital Image Processing |
|   |   |   |
|   |   | Upon completion of this course, the students will be able to:  
|   |   | 1. Review the fundamental concepts of a digital image processing system.  
|   |   | 2. Analyze images in the frequency domain using various transforms.  
|   |   | 3. Evaluate the techniques for image enhancement and image restoration.  
|   |   | 4. Categorize various compression techniques.  
|   |   | 5. Interpret Image compression standards.  
|   |   | 6. Interpret image segmentation and representation techniques. |
|   |   |   |
| 8. | 17CTU504B | Multimedia and its Applications |
|   |   |   |
|   |   | Upon successful completion the student will be able to:  
|   |   | 1. Define multimedia to potential clients.  
|   |   | 2. Identify and describe the function of the general skill sets in the multimedia industry.  
|   |   | 3. Identify the basic components of a multimedia project. |
4. Identify the basic hardware and software requirements for multimedia development and playback.
5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).
6. Use appropriate tools for the design, development and creation of digital media artefacts.

9. 17CTU511A  Cryptography and Network Security - Practical
After successful completion of the course, the learners would be able to:
1. Illustrate various Public key cryptographic techniques
2. Evaluate the authentication and hash algorithms
3. Provide security of the data over the network.
4. Do research in the emerging areas of cryptography and network security.
5. Implement various networking protocols.
6. Protect any network from the threats in the world

10. 17CTU511B  Software Testing - Practical
After the completion of this course, a successful student will be able to:
1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.
2. Work effectively as leader/member of a development team to deliver quality software artifacts.
3. Analyze, specify and document software requirements for a software system.
4. Verify, validate, assess and assure the quality of software artifacts.
5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.
6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.

11. 17CTU512A  .NET Programming - Practical
After the completion of this course, a successful student will be able to:
1. Grasp the fundamentals of a programming language and know the basic differences between programming languages
2. Choose the architecture based on the problem to be solved.
3. Differentiate between the types of applications supported by .Net
4. Build, compile and execute a VB .Net program
5. Apply techniques to develop error-free software
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts

12. 17CTU512B  Network Programming - Practical
After the completion of this course, a successful student will be able to:
1. Analyze the various transmission media, their comparative study, fibre optics and wireless media
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| 2. | Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites. | 3. TCP, UDP, SCTP protocols Ethernet and LAN administration.  
4. Details of IP operations in the INTERNET and associated routing principles  
5. Understand the key protocols which support the Internet.  
6. Create applications using techniques such as multiplexing, forking, multithreading |
| 13.  | 17CTU513A | Introduction to Data Science - Practical |
|   | After the completion of this course, a successful student will be able to:  
1. Understand the problems solvable with data science and an ability to attack them from a statistical perspective.  
2. Understand when to use supervised and unsupervised statistical learning methods on labelled and unlabelled data-rich problems.  
3. Create data analytical pipelines and applications in Python.  
4. Familiar data science ecosystem and the various tools needed to continue developing as a data scientist.  
5. Develop the mindset to work like a data scientist, and follow a methodology to tackle different types of data science problems.  
6. Describe what data science and machine learning are, their applications & use cases, and various types of tasks performed by data scientists |
| 14.  | 17CTU513B | Data Mining - Practical |
|   | After the completion of this course, a successful student will be able to:  
1. Introduce students to the basic concepts and techniques of Data Mining.  
2. Develop skills of using recent data mining software for solving practical problems.  
3. Gain experience of doing independent study and research.  
4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning  
5. Identify appropriate data mining algorithms to solve real world problems.  
6. Benefit the user experiences towards research and innovation, integration |
| 15.  | 17CTU514A | Digital Image Processing - Practical |
|   | Upon completion of this course, the students will be able to:  
1. Review the fundamental concepts of a digital image processing system.  
2. Analyze images in the frequency domain using various transforms.  
3. Evaluate the techniques for image enhancement and image restoration.  
4. Categorize various compression techniques.  
5. Interpret Image compression standards.  
6. Interpret image segmentation and representation techniques. |
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<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Upon successful completion the student will be able to:</th>
</tr>
</thead>
</table>
| 16. | 17CTU514B   | Multimedia and its Applications - Practical | 1. Define multimedia to potential clients.  
2. Identify and describe the function of the general skill sets in the multimedia industry.  
3. Identify the basic components of a multimedia project.  
4. Identify the basic hardware and software requirements for multimedia development and playback.  
5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).  
6. Use appropriate tools for the design, development and creation of digital media artefacts. |
| 17. | 17CTU601A   | PHP Programming                               | Upon completion of this course, the students will be able to:  
1. Write PHP scripts to handle HTML forms.  
2. Write regular expressions including modifiers, operators, and metacharacters.  
3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.  
4. Analyze and solve various database tasks using the PHP language.  
5. Analyze and solve common Web application tasks by writing PHP programs  
6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website. |
| 18. | 17CTU601B   | Unix / Linux Programming                      | be able to  
1. Develop software for Linux/UNIX systems.  
2. Learn the C language and get experience programming in C.  
3. Learn the important Linux/UNIX library functions and system calls.  
4. Understand the inner workings of UNIX-like operating systems.  
5. Obtain a foundation for an advanced course in operating systems.  
6. Construct various shell scripts for simple applications |
| 19. | 17CTU602A   | E-Commerce Technologies                       | Upon successful completion of this course, the student will be able to:  
1. Describe an example of system architecture for an e-Business.  
2. List the seven major elements of web design.  
3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.  
4. Identify the major electronic payment issues and options.  
5. Discuss security issues and explain procedures used to protect against security threats.  
6. Identify and discuss management issues underlying e-Commerce issues including organizational structure, strategic planning, goal setting, corporate social responsibility, international arena, changing market intermediaries, resource allocation and customer service |
<p>| 20. | 17CTU602B   | Cloud Computing                               | Upon completion of this course, the students will be able to |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Upon completion of the course, the student will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>17CTU603A</td>
<td>Soft Computing</td>
<td>1. List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.</td>
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<td>2. Explain the concepts and meta-cognitive of soft computing.</td>
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<td>3. Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.</td>
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<td>4. Outline facts to identify process/procedures to handle real world problems using soft computing.</td>
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<td>5. Evaluate various techniques of soft computing to defend the best working solutions.</td>
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<td>6. Design hybrid system to revise the principles of soft computing in various applications.</td>
</tr>
<tr>
<td>17CTU603B</td>
<td>System Programming</td>
<td>1. Organize the functionalities and components of a computer system into different layers, and have a good understanding of the role of system programming and the scope of duties and tasks of a system programmer</td>
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<td>2. Grasp the concepts and principles, and be familiar with the approaches and methods of developing system-level software (e.g., compiler, and networking software)</td>
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<td>3. Apply the knowledge and techniques learnt to develop solutions to real world problems</td>
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<td>4. Select and make use of the OS kernel functions and their APIs, standard programming languages, and utility tools</td>
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<td>5. Organize and manage software built for deployment and demonstration.</td>
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<td>6. Analyze requirements and solve problems using systematic planning and development approaches</td>
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<tr>
<td>17CTU611A</td>
<td>PHP Programming - Practical</td>
<td>1. Write PHP scripts to handle HTML forms.</td>
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<td>2. Write regular expressions including modifiers, operators, and metacharacters.</td>
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<td>3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</td>
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<td>4. Analyze and solve various database tasks using the PHP language.</td>
</tr>
</tbody>
</table>
5. Analyze and solve common Web application tasks by writing PHP programs
6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website.

24. 17CTU611B Unix / Linux Programming - Practical
Upon completion of this course, the students will be able to
1. Develop software for Linux/UNIX systems.
2. Learn the C language and get experience programming in C.
3. Learn the important Linux/UNIX library functions and system calls.
4. Understand the inner workings of UNIX-like operating systems.
5. Obtain a foundation for an advanced course in operating systems.
6. Construct various shell scripts for simple applications.

25. 17CTU612A E-Commerce Technologies - Practical
Upon successful completion of this course, the student will be able to:
1. Describe an example of system architecture for an e-Business.
2. List the seven major elements of web design.
3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.
4. Identify the major electronic payment issues and options.
5. Discuss security issues and explain procedures used to protect against security threats.
6. Identify and discuss management issues underlying e-Commerce issues including organizational structure, strategic planning, goal setting, corporate social responsibility, international arena, changing market intermediaries, resource allocation and customer service.

26. 17CTU612B Cloud Computing - Practical
Upon completion of this course, the students will be able to
1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
2. Design different workflows according to requirements and apply map reduce programming model.
3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
4. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds.
5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.
6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

27. 17CTU613A Soft Computing - Practical
Upon completion of the course, the student will be able to:
1. List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.
2. Explain the concepts and meta-cognitive of soft computing.
3. Apply soft computing techniques to solve character recognition, pattern classification, regression and similar problems.
4. Outline facts to identify processes/procedures to handle real-world problems using soft computing.
5. Evaluate various techniques of soft computing to defend the best working solutions.
6. Design hybrid systems to revise the principles of soft computing in various applications.

28. 17CTU613B System Programming - Practical
Upon completion of the subject, students will be able to
1. Organize the functionalities and components of a computer system into different layers, and have a good understanding of the role of system programming and the scope of duties and tasks of a system programmer.
2. Grasp the concepts and principles, and be familiar with the approaches and methods of developing system-level software (e.g., compiler, and networking software).
3. Apply the knowledge and techniques learnt to develop solutions to real-world problems.
4. Select and make use of OS kernel functions and their APIs, standard programming languages, and utility tools.
5. Organize and manage software built for deployment and demonstration.
6. Analyze requirements and solve problems using systematic planning and development approaches.

29. 18CTU301 Data Structures
After the completion of this course, a successful student will be able to:
1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Identify different parameters to analyze the performance of an algorithm.
4. Apply concepts learned in various domains like DBMS, compiler construction etc.
5. Use linear and non-linear data structures like stacks, queues, linked list etc.
6. Illustrate various techniques for searching, sorting and hashing.

30. 18CTU302 Data Communication and Networks
Upon completion of the course, students will be able to:
1. Describe the functions of each layer in OSI and TCP/IP model.
2. Explain the functions of Application layer and Presentation layer paradigms and protocols.
3. Describe the Session layer design issues and Transport layer services.
4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.
5. Describe the functions of data link layer and explain the protocols.
6. Explain the types of transmission media with real-time applications.

31. 18CTU303 Relational Database
Upon completion of the course, students will be able to
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Management Systems</td>
<td>1. Explain the features of database management systems and Relational database. 2. Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra. 3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL. 4. Retrieve any type of information from a data base by formulating complex queries in SQL. 5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database. 6. Build indexing mechanisms for efficient retrieval of information from a database.</td>
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</tr>
<tr>
<td>18CTU304A</td>
<td>Android Programming</td>
<td>Upon completion of this course, the students will able to 1. Describe Android platform, Architecture and features. 2. Design User Interface and develop activity for Android App. 3. Use Internet, Broadcast receivers and Internet services in Android App. 4. Design and implement Database Application and Content providers. 5. Use multimedia, camera and Location based services in Android App. 6. Discuss various security issues in Android platform</td>
</tr>
<tr>
<td>18CTU304B</td>
<td>Programming in Python</td>
<td>Upon completion of the course, students will be able to 1. Develop algorithmic solutions to simple computational problems 2. Read, write, execute by hand simple Python programs. 3. Structure simple Python programs for solving problems. 4. Decompose a Python program into functions. 5. Represent compound data using Python lists, tuples, dictionaries. 6. Read and write data from/to files in Python Programs.</td>
</tr>
<tr>
<td>18CTU401</td>
<td>Operating Systems</td>
<td>After the completion of this course, a successful student will be able to: 1. Describe the important computer system resources and the role of operating system in their management policies and algorithms. 2. Perform the role of operating system in their management policies and algorithms. 3. Understand the process management policies and scheduling of processes by CPU. 4. Evaluate the requirement for process synchronization and coordination handled by operating system. 5. Describe and analyze the memory management and its allocation policies. 6. Identify use and evaluate the storage management policies with respect to different storage management technologies, identify the need to create the special purpose operating system.</td>
</tr>
<tr>
<td>18CTU402</td>
<td>Software Engineering</td>
<td>After the completion of this course, a successful student will be able to: 1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</td>
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<td>Course Code</td>
<td>Course Name</td>
<td>Objectives</td>
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<tr>
<td>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</td>
<td>3. Analyze, specify and document software requirements for a software system.</td>
<td>4. Verify, validate, assess and assure the quality of software artifacts.</td>
</tr>
<tr>
<td>5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.</td>
<td>6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.</td>
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<tr>
<td>36. 18CTU403 Artificial Intelligence</td>
<td>At the end of the course, the student should be able to:</td>
<td>1. Identify problems that are amenable to solution by AI methods.</td>
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<tr>
<td>2. Identify appropriate AI methods to solve a given problem.</td>
<td>3. Formalize a given problem in the language/framework of different AI methods.</td>
<td>4. Implement basic AI algorithms.</td>
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<tr>
<td>5. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.</td>
<td>6. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.</td>
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</tr>
<tr>
<td>37. 18CTU404A Scripting Language</td>
<td>At the end of the course, the student should be able to:</td>
<td>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</td>
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<tr>
<td>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</td>
<td>3. Use the JavaScript to develop the dynamic web pages.</td>
<td>4. Use server side scripting with JSP to generate the web pages dynamically.</td>
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<td>5. Gain knowledge of client side scripting, validation of forms and AJAX programming.</td>
<td>6. Create applications by using the concepts like JSP and Servlet</td>
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<tr>
<td>38. 18CTU404B XML Programming</td>
<td>After the completion of this course, a successful student will be able to:</td>
<td>1. Create a new webpage</td>
</tr>
<tr>
<td>2. Understand the fundamental features of web applications.</td>
<td>3. Understand the objects and components needed for a web designing.</td>
<td>4. Understand the current industry support for XML technologies.</td>
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<tr>
<td>5. Sharpen the students’ practical development skills via focused assignments and projects.</td>
<td>6. Understand what is XML and how to parse and use XML Data.</td>
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<tr>
<td>Course Code</td>
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<tr>
<td>39. 18CTU411</td>
<td>Operating Systems - Practical</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<td>40. 18CTU412</td>
<td>Software Engineering - Practical</td>
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<td>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</td>
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<td>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</td>
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<td>3. Implement a given software design using sound development practices.</td>
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<td>4. Verify, validate, assess and assure the quality of software artifacts.</td>
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<td>5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.</td>
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<td>6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.</td>
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<td>41. 18CTU413</td>
<td>Artificial Intelligence - Practical</td>
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<td>Scripting Language - Practical</td>
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</table>
| 43. 18CTU414B | XML Programming - Practical | After the completion of this course, a successful student will be able to:  
1. Create a new webpage  
2. Understand the fundamental features of web applications.  
3. Understand the objects and components needed for a web designing.  
4. Understand the current industry support for XML technologies.  
5. Sharpen the students’ practical development skills via focused assignments and projects.  
6. Understand what is XML and how to parse and use XML Data |
| 44. 19LSU101 | Language – I | 1. மொழியியல் நுட்பங்கள் பயிற்சி (வெளியில் பயிற்சி பயிற்சி) மற்றும் அறிவியல் பாடல்கள் மற்றும் கல்வியுருவுகள். ஆனால் மொழியியல் நுட்பங்கள் பயிற்சிக்கு முன்னோடியான அறிவியல் பாடல்கள்.  
2. பொழுதுபோக்கு செய்யும் முன்னோடி பயிற்சி மற்றும் கல்வியுருவுகள் குறிப்பிட்டு அறிவியல் பாடல்கள் மற்றும் கல்வியுருவுகள் குறிப்பிட்டு அறிவியல் பாடல்கள்.  
3. மொழியியல் நுட்பங்கள் பயிற்சி நுட்பங்கள். ஆணானாய் பிறமாக, மொழியியல் நுட்பங்கள் பயிற்சி நுட்பங்கள் எழுத முடிகிறது.  
4. பொழுதுபோக்கு செய்யும் முன்னோடி பயிற்சி நுட்பங்கள் பயிற்சி நுட்பங்கள். பொழுதுபோக்கு செய்யும் முன்னோடி பயிற்சி நுட்பங்கள் எழுத முடிகிறது.  
5. மொழியியல் நுட்பங்கள் பயிற்சி நுட்பங்கள் எழுத முடிகிறது. மொழியியல் நுட்பங்கள் எழுத முடிகிறது.  
6. மொழியியல் நுட்பங்கள் எழுத முடிகிறது. பொழுதுபோக்கு செய்யும் முன்னோடி பயிற்சி நுட்பங்கள் எழுத முடிகிறது. |
| 45. 19CTU101 | Programming Fundamentals using C / C++ | After the completion of this course, a successful student will be able to:  
1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.  
2. Develop programs using the basic elements like control statements, Arrays and Strings.  
3. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory  
4. Understand about the code reusability with the help of user defined functions.  
5. Develop advanced applications using enumerated data types, function pointers and nested structures, the basic object-oriented design principles in computer problem solving. |
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<td>6.</td>
<td>Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems, the uses of pre-processors and various header file directives, the characteristics of an object-oriented programming language in a program.</td>
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<td>46.</td>
<td>19CTU102</td>
<td>Computer System Architecture</td>
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<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td>1. Acquire a basic knowledge about computer system architecture, digital circuits and the low-level programming skills.</td>
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<td>2. Understand the inner workings and performance capabilities of advanced microprocessors.</td>
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<td>3. Solve the problems using Boolean algebra</td>
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<td>4. Understand the basic computer organization and design.</td>
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<td>5. Learn about Cache memory and its importance</td>
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<td>6. Solve the binary arithmetic problems and conversion among the number systems</td>
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<tr>
<td>47.</td>
<td>19CTU103</td>
<td>Computer Fundamentals</td>
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<td>After the completion of this course, a successful student will be able to:</td>
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<tr>
<td></td>
<td>1. Understand the meaning and basic components of a computer system,</td>
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<td>2. Define and distinguish Hardware and Software components of computer system,</td>
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<td>3. Explain and identify different computing machines during the evolution of computer system, gain knowledge about five generations of computer system,</td>
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<td>4. Identify and discuss the functional Units of a computer system, identify the various input and output Units and explain their purposes</td>
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<td>5. Understand the role of CPU and its components, understand the concept and need of primary and secondary memory, discuss the advantages, limitations and applications of computers.</td>
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<td>6. Understand the classification of computers, distinguish the computers on the basis of purpose, technology and size</td>
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<tr>
<td>48.</td>
<td>19CTU111</td>
<td>Programming Fundamentals using C / C++ - Practical</td>
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<td>After the completion of this course, a successful student will be able to:</td>
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<td>49.</td>
<td>19CTU112</td>
<td>Computer System Architecture - Practical</td>
</tr>
<tr>
<td>50.</td>
<td>19CTU113</td>
<td>Computer Fundamentals - Practical</td>
</tr>
<tr>
<td>51.</td>
<td>19AEC101</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>52.</td>
<td>19LSU201</td>
<td>Language – II</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Description</td>
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</tbody>
</table>
| 19ENU201    | English     | 1. Develop the knowledge of interpersonal skills.  
2. Establish and maintain social relationships.  
3. Genres of literature will give moral values of life.  
4. Develop communication skills in business environment  
5. Communication skills will get developed.  
6. Develop to have language competence. |
| 19CTU201    | Programming in JAVA | After completion of this course, the students will be able to  
1. Obtain knowledge of the structure and model of the Java programming language.  
2. Use the Java programming language for various programming technologies (understanding)  
3. Develop software in the Java programming language (application)  
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)  
5. Use certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)  
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation) |
| 19CTU202    | Discrete Structures | On successful completion of the course, students will be able to  
1. Familiar with elementary algebraic set theory.  
2. Acquire a fundamental understanding of the core concepts in growth of functions.  
3. Describe the method of recurrence relations.  
4. Get wide knowledge about graphs and trees  
5. Initiate to knowledge from inference theory |
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</thead>
<tbody>
<tr>
<td>19CTU203</td>
<td>Computer Networks and Internet</td>
<td>After the completion of this course, a successful student will be able to:</td>
</tr>
<tr>
<td></td>
<td>Technologies</td>
<td>1. Independently understand basic computer network technology.</td>
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<td>2. Understand and explain Data Communications System and its components.</td>
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<td>3. Identify the different types of network topologies and protocols, enumerate the</td>
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<td>layers of the OSI model and TCP/IP.</td>
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<td>4. Employ fundamental computer theory to basic programming techniques, gain the</td>
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<td>skills and project-based experience needed for entry into web design and</td>
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<td>development careers.</td>
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<td>5. Develop awareness and appreciation of the many ways that people access the web,</td>
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<td>and will be able to create standards-based websites that can be accessed by the</td>
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<td>full spectrum of web access technologies.</td>
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<td>6. Select and apply mark-up languages for processing, identifying, and presenting</td>
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<td>of information in web pages, create and manipulate web media objects using editing</td>
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<td></td>
<td>software.</td>
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<tr>
<td>19CTU211</td>
<td>Programming in JAVA - Practical</td>
<td>After completion of this course, the students will be able to:</td>
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<td></td>
<td>1. Obtain knowledge of the structure and model of the Java programming language.</td>
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<td>2. Use the Java programming language for various programming technologies</td>
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<tr>
<td></td>
<td></td>
<td>(understanding)</td>
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<td></td>
<td>3. Develop software in the Java programming language (application)</td>
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<td>4. Evaluate user requirements for software functionality required to decide whether</td>
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<td></td>
<td>the Java programming language can meet user requirements (analysis)</td>
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<td>5. Use certain technologies by implementing them in the Java programming language</td>
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<td>to solve the given problem (synthesis)</td>
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<td></td>
<td>6. Choose an engineering approach to solving problems, starting from the acquired</td>
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<td>knowledge of programming and knowledge of operating systems. (evaluation)</td>
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<tr>
<td>19CTU212</td>
<td>Discrete Structures - Practical</td>
<td>On successful completion of the course, students will be able to</td>
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<td>1. Familiar with elementary algebraic set theory.</td>
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<td>2. Acquire a fundamental understanding of the core concepts in growth of functions.</td>
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<td>3. Describe the method of recurrence relations.</td>
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<td>4. Get wide knowledge about graphs and trees</td>
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<td>5. Initiate to knowledge from inference theory</td>
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<td>6. Solve problems with the help of tools of mathematical analysis</td>
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<tr>
<td>19CTU213</td>
<td>Computer Networks and Internet</td>
<td>After the completion of this course, a successful student will be able to:</td>
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<td></td>
<td>Technologies Practical</td>
<td>1. Independently understand basic computer network technology.</td>
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<td>2. Understand and explain Data Communications System and its components.</td>
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<td>3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP.</td>
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<td>4. Employ fundamental computer theory to basic programming techniques, gain the skills and project-based experience needed for entry into web design and development careers.</td>
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<td>5. Develop awareness and appreciation of the many ways that people access the web, and will be able to create standards-based websites that can be accessed by the full spectrum of web access technologies.</td>
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<tr>
<td>6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages, create and manipulate web media objects using editing software.</td>
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</table>
Name of the Department: **Computer Science**

**Course:** M.Sc. Computer Science

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.     | 18CSP301    | J2EE                        | 1. Understand the In-depth concepts of J2EE  
2. Understand the in-depth Life cycle of servlets and JSP.  
3. Learn how to communicate with databases using Java.  
4. Handle Errors and Exceptions in Web Applications  
5. Use NetBeans IDE for creating J2EE Applications  
6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications |
| 2.     | 18CSP302    | Open Source Technologies    | At the end of the course the student will be in a position to  
1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.  
2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.  
3. Understand basics of various OS related concepts, from programmer’s point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.  
4. Develop applications where several processes need to communicate with each other to complete a task.  
5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.  
6. Write programs which employs advanced concepts like multithreading. |
| 3.     | 18CSP303    | Digital Image Processing    | 1. Perform image manipulations and analysis in many different fields.  
2. Apply knowledge of computing mathematics science and engineering to solve problems in multidisciplinary research.  
3. Implement the understanding in sharpening the image.  
4. Perform the image segmentation using the compression method.  
5. Understand the image to represent in an region.  
6. Analyze the basic algorithms used for image processing &image compression with morphological image processing. |
| 4.     | 18CSP304    | Green Computing             | 1. Give an account of the concept green IT,  
2. Give an account of Green Assets and Modelling,  
3. Describe green IT in grid framework in relation to technology,  
4. Relate green IT to sustainable development,  
5. Evaluate IT use in relation to environmental perspectives,  
6. Analyze case studies based on green IT. |
| 5.     | 18CSP305B   | Wireless Application Protocol | 1. Pursue research in the area of wireless communication.  
2. Develop applications that are mobile-device specific and demonstrate current practice in mobile communication contexts. |
3. Understand Components of the WAP Standards and Wireless Telephony Applications
4. Appreciate the contribution of Wireless Communication networks to overall technological growth.
5. Compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.
6. Design and Develop a wireless application using WML

6. 18CSP311 J2EE - Practical
1. Understand the In-depth concepts of JEE
2. Understand the in-depth Life cycle of servlets and JSP.
3. Learn how to communicate with databases using Java.
4. Handle Errors and Exceptions in Web Applications
5. Use NetBeans IDE for creating J2EE Applications
6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications

7. 18CSP312 Linux - Practical
At the end of the course the student will be in a position to
1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
3. Understand basics of various OS related concepts, from programmer’s point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
4. Develop applications where several processes need to communicate with each other to complete a task.
5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
6. Write programs which employs advanced concepts like multithreading.

8. 19CSP101 Python Programming
1. Master an understanding of scripting and the contributions of scripting languages.
2. Master an understanding of Python especially the object oriented concepts
3. Master an understanding of the built in objects of Python
5. Read and write data from/to files in Python Programs.
6. Be exposed to advanced applications such as TCP/IP network programming, multithreaded programming, Web applications.

9. 19CSP102 Big Data Analytics
On successful completion of the course the student should be able to:
1. Apply Hadoop ecosystem components.
2. Access and Process Data on Hbase, Pig and HiveQL queries
3. Manage Job Execution in Hadoop Environment
4. Analyze Map Reduce Types
5. Apply Data Model and Connect your data and Dashboard.
6. Participate data science and big data analytics projects
<table>
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<tr>
<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Learning Outcomes</th>
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<tbody>
<tr>
<td>10.</td>
<td>19CSP103</td>
<td>Cryptography and Network Security</td>
<td>On successful completion of the course the student should be able to: 1. Classify the symmetric encryption techniques 2. Illustrate various Public key cryptographic techniques 3. Evaluate the authentication and hash algorithms. 4. Summarize the intrusion detection and its solutions to overcome the attacks. 5. Understand basic concepts of system level security 6. Build secure authentication systems by use of message authentication techniques.</td>
</tr>
<tr>
<td>11.</td>
<td>19CSP104</td>
<td>Cloud Computing</td>
<td>Upon completion of this course the students will be able to: 1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds. 2. Know the architecture of the cloud and the usage of clouds. 3. Secure their data from the security issues. 4. Make the students to work based on the various service level agreements. 5. Work with the traditional cloud and Microsoft azure, etc. 6. Provide a good understanding of the concepts, standards and protocols in Cloud computing</td>
</tr>
<tr>
<td>12.</td>
<td>19CSP105A</td>
<td>Wireless and Mobile Computing</td>
<td>1. Grasp the concepts and features of mobile computing technologies and applications 2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support 3. Identify the important issues of developing mobile computing systems and applications 4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities; 5. Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools; 6. Organize and manage software built for deployment and demonstration.</td>
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<tr>
<td>13.</td>
<td>19CSP111</td>
<td>Python Programming - Practical</td>
<td>1. Master an understanding of scripting and the contributions of scripting languages. 2. Master an understanding of Python especially the object oriented concepts 3. Master an understanding of the built in objects of Python 4. Represent compound data using Python lists, tuples, dictionaries. 5. Read and write data from/to files in Python Programs. 6. Be exposed to advanced applications such as TCP/IP network programming, multithreaded programming, Web applications</td>
</tr>
</tbody>
</table>
| 14. | 19CSP112 | Hadoop - Practical | On successful completion of the course the student should be able to:  
1. Apply Hadoop ecosystem components.  
2. Access and Process Data on Hbase, Pig and HiveQL queries  
3. Manage Job Execution in Hadoop Environment  
4. Analyze Map Reduce Types  
5. Apply Data Model and Connect your data and Dashboard  
6. Participate data science and big data analytics projects  |
| 15. | 19CSP201 | Internetworking with TCP/IP | At the completion of the course, students will:  
1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.  
2. Understand IP Addressing Fundamentals  
4. Learn about host name resolution and the Domain Name System (DNS).  
5. Learn about services and operations of DHCP Servers and Domain Name Servers  
6. Create major applications using the key TCP/IP protocols  |
| 16. | 19CSP202 | Cyber Security | A student who successfully completes this course should at a minimum be able to:  
1. State the basic concepts in information security, including security policies, security models, and security mechanisms.  
2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.  
3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.  
4. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.  
5. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.  
6. The learner will be able to examine secure software development practices.  |
| 17. | 19CSP203 | MongoDB | 1. To provide students the right skills and knowledge needed to develop Applications on MongoDB  
2. To provide students the right skills and knowledge needed to run Applications on MongoDB  
3. Writing MongoDB programs from JavaScript shell.  
4. Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB  
5. Perform query optimization in MongoDB  
6. Understand replication and sharding in MongoDB  |
<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>19CSP204</td>
<td>Internet of Things</td>
<td>A student who successfully completes this course should at a minimum be able to: 1. Understand building blocks of Internet of Things and characteristics. 2. Understand IoT protocols, Web of Things and Integrating IOT. 3. Understand the application areas of IoT. 4. Realize the revolution of Internet in Mobile Devices, Cloud &amp; Sensor Networks. 5. Learn about communication technologies used in IoT. 6. Learn about Web of Things, Structural models and applications of IoT.</td>
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<tr>
<td>19CSP205B</td>
<td>Machine Learning</td>
<td>On successful completion of the course the student should be 1. Remember the basic concepts and techniques of Machine Learning. 2. Develop skills of using recent machine learning software for solving practical problems. 3. of doing independent study and research. 4. To recognize the characteristics of machine learning that make it useful to real-world problems. 5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. 6. To effectively use machine learning toolboxes</td>
</tr>
<tr>
<td>19CSP211</td>
<td>Router Configuration - Practical</td>
<td>At the completion of the course, students will: 1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite. 2. Understand the routing IP datagrams and checksum. 3. Exposed to unicast and multicast routing. 4. Learn about host name resolution and the Domain Name System (DNS). 5. Learn about services and operations of DHCP Servers and Domain Name Servers. 6. Understand about SMTP and SNMP.</td>
</tr>
<tr>
<td>19CSP212</td>
<td>MongoDB - Practical</td>
<td>1. To provide students the right skills and knowledge needed to develop Applications on MongoDB. 2. To provide students the right skills and knowledge needed to run Applications on MongoDB. 3. Writing MongoDB programs from JavaScript shell. 4. Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB. 5. Perform query optimization in MongoDB. 6. Understand replication and sharding in MongoDB.</td>
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**Name of the Department:** Electronics and Communication Systems  

**Course:** B.Sc. Electronics and Communication Systems

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.      | 17ECU501A   | Programmable Logic Controller       | 1. Identify the main parts of programmable logic controller  
2. Develop logic gate circuits for Boolean expressions  
3. Able to state basic PLC Terminology  
4. Identify logical process control, in automation.  
5. Describe how a programmable logic controller is programmed.  
6. Describe switching elements on input/output modules. |
| 2.      | 17ECU501B   | Nano Electronics                    | 1. Understand the fundamentals of Nano Electronics and its properties.  
2. Gain the concepts of quantum theory.  
3. Understand the latest technology on nano systems based Nano electronics  
4. Identify the various methods to fabricate and measure Nanoscale features.  
5. Evaluate the critical parameters when considering any new Nano electronics device.  
6. Understand the applications of Nano Electronics. |
2. Understand the Wireless communication systems and its standards  
3. Apply analytical and empirical models in the design of wireless links.  
4. Evaluate the characteristics of speech signals and their frequency limitations.  
5. Describe and evaluate the design and performance of digital and analog circuits.  
6. Ability to analyse and evaluate digital communication systems. |
| 4.      | 17ECU502B   | Control Systems                     | 1. Understand the concept of time response and frequency response of the system.  
2. Analyze feedback characteristics of linear control systems to reduce the disturbance.  
3. Analyze time response of first and second order control systems for different standard test signals.  
4. Perform frequency domain analysis of linear control system using nyquist stability criterion.  
5. Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the a system.  
6. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions. |
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<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Objectives</th>
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| 5. | 17ECU503A   | Biomedical Instrumentation | 1. Understand the fundamental concept of origin of Bio-electric signals and recording it with highly precision equipment.  
2. Differentiate and analyze the biomedical signal sources.  
3. Identify common biomedical signals and distinguish characteristic features.  
4. Ability to study various transducers  
5. Identify common signal artifacts, their sources and formulate strategies for their suppression.  
6. Familiarize with patient safety issues related to biomedical instrumentation. |
| 6. | 17ECU503B   | Signals And Systems | 1. Understand about various types of signals and systems, classify them, analyze them and perform various operations.  
2. Understand the use of transform to analysis of signals and systems in continuous and discrete time domain.  
3. Implement the concept and theory of signals and systems in electronics and communication field.  
4. Ability to have idea of signal and system analysis and its characterization in time and frequency domain.  
5. Students can perform mathematical and graphical convolution of signals and systems.  
6. Compute the Fourier series or Fourier transform Z-transform |
| 7. | 17ECU504A   | Robotics | 1. Understand the relationship between mechanical structures of industrial robots and their operational workspace characteristics.  
2. Illustrate the kinematics and dynamics of robotics.  
3. Implementation of related instrumentation and control in robotics.  
4. Ability to solve inverse kinematics of simple robot manipulators.  
5. Able to do the path planning for a robotic system.  
6. Identify a Robot for a specific application. |
| 8. | 17ECU504B   | Mobile Applications Development | 1. Understand system requirements for mobile applications.  
2. Generate suitable design using specific mobile development framework.  
3. Apply analytical and empirical models in the design of wireless links.  
4. Develop user interfaces for the android platform.  
5. Identify the interaction between user interface and underlying application infrastructure.  
6. Configure android application development tools. |
2. Diagnose faults in programmable logic controller  
3. Test a programmable logic controller discrete device for correct response.  
4. Implement logic gate circuits from Boolean expressions |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>10. 17ECU511B</td>
<td>Nano Electronics - Practical</td>
<td>5. Ability to design and program basic PLC circuits for entry-level PLC Applications. 6. Design and program a small, automated industrial production</td>
</tr>
<tr>
<td>11. 17ECU512A</td>
<td>Advanced Communication Systems - Practical</td>
<td>1. Ability to perform simple analysis of nano-electronic devices. 2. Familiarize with certain nano-electronic systems and its building blocks 3. Acquire knowledge on carbon nanotubes and its application in nano electronics. 4. Evaluate the quantum and nanosized scale effects on materials 5. Ability to calculate the density of states in nano electronic devices. 6. Understand the impact of nanoelectronics onto information technology and communication systems.</td>
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<tr>
<td>12. 17ECU512B</td>
<td>Control Systems - Practical</td>
<td>1. Analyze different parameters of analog communication techniques 2. Implement various modulation and demodulation techniques of electronic communication systems. 3. Evaluate the generation and detection of pulse modulation techniques. 4. Familiarize with the design, analysis and operation of electronic communication. 5. Identify and solve basic communication problems. 6. Analyze the transmitter and receiver circuits</td>
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<tr>
<td>13. 17ECU513A</td>
<td>Biomedical Instrumentation - Practical</td>
<td>1. Get exposure to human body parameter measurement 2. Measure non-invasive diagnostic parameters. 3. Design and operate biopotential amplifiers. 4. Identify common biomedical signals 5. Inspect common biomedical signals and distinguish characteristic features. 6. Outline the design of cardiac pacemakers and defibrillators.</td>
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<td>14.</td>
<td>17ECU513B</td>
<td>Signals And Systems - Practical</td>
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<td>15.</td>
<td>17ECU514A</td>
<td>Robotics - Practical</td>
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<td>16.</td>
<td>17ECU514B</td>
<td>Mobile Applications Development - Practical</td>
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<td>17.</td>
<td>17ECU601A</td>
<td>Embedded Systems</td>
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<td>18.</td>
<td>17ECU601B</td>
<td>Basic VLSI Design</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Learning Outcomes</td>
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| 19. 17ECU602A | Digital Signal Processing                        | 1. Understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform  
2. Ability to compute various transform analysis of Linear Time Invariant Systems.  
3. Implement problem solving strategies to DSP Problems.  
4. Able to test signal processing algorithms for various applications  
5. Ability to understand Various applications of DSP such as signal processing and telecommunication.  
6. Apply design techniques for FIR type digital filters |
| 20. 17ECU602B | Virtual Instrumentation                          | 1. Understand basics of acquisition techniques and its interface.  
2. Recognize the components of virtual instrumentations and measurement.  
3. Get adequate knowledge in VI Tool sets.  
4. Use Lab view software for instrument control, measurement and data acquisition.  
5. Understand VI Programming techniques.  
6. Ability to use state machines to solve complex problems. |
| 21. 17ECU603A | Programming With LABVIEW                         | 1. Gain knowledge on the different data types and methods to organize and group data, controls, and indicators in LABVIEW  
2. Understand various functions available in Lab View for instrumentation applications.  
3. Ability to model complex system using Lab view.  
4. Ability to improve lab view programming skills  
5. Able to use graphical programming language.  
6. Ability to simulate and test behaviour of system. |
| 22. 17ECU603B | Verilog And FPGA Based System Design             | 1. Understand the fundamentals of Verilog and FPGA based system design.  
2. Design and optimize complex combinational and sequential digital circuits  
3. Apply design flow methodology for a given problem  
4. Solve time related problems  
5. Implement and debug various digital designs.  
6. Analyze a given design based on synthesis, implementation and timing reports |
| 23. 17ECU611A | Embedded Systems - Practical                     | 1. Ability to write the programs for microcontrollers  
2. Apply and analyze the applications in various processors and domains of embedded systems. |
3. Analyze to understand the different concepts of RTOS, sensors, memory interface and communication interface.
4. Incorporate suitable microcontroller along with appropriate interfacing circuits and implement the same for association with software programs.
5. Design real time embedded systems using the concepts of RTOS.
6. Develop the hardware for embedded system application based on the processors.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Details</th>
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</thead>
</table>
| 24. 17ECU611B | Basic VLSI Design - Practical | 1. Design MOSFET based logic circuit.
<p>|             |                                    | 2. Implement logic circuits with different design styles |
|             |                                    | 3. Demonstrate an understanding of working principle of operation of different types of memories. |
|             |                                    | 4. Demonstrate an understanding of working principle of clocking, power reduction and distribution. |
|             |                                    | 5. Familiarize with the fabrication techniques of Integrated Circuits. |
|             |                                    | 6. Able to solve performance issues in circuit layout. |
| 25. 17ECU612A | Digital Signal Processing - Practical | 1. Ability to design and test signal processing algorithms for various applications |
|             |                                    | 2. Able to design and simulate digital filters |
|             |                                    | 3. Ability to recover information from signals. |
|             |                                    | 4. Evaluate transform analysis of linear time invariant systems. |
|             |                                    | 5. Apply digital time signal processing theory to real world signal processing applications. |
|             |                                    | 6. Analyze z-transforms and discrete time fourier transforms of digital system |
| 26. 17ECU612B | Virtual Instrumentation - Practical | 1. Analyze and design different types of programs based on data acquisition. |
|             |                                    | 2. Represent and review signals in digital domain |
|             |                                    | 3. Select proper data acquisition hardware. |
|             |                                    | 4. Configure data acquisition hardware in Lab view. |
|             |                                    | 5. Identify the analysing tools and simple programming in VI |
|             |                                    | 6. Design program for application development. |
| 27. 17ECU613A | Programming With LABVIEW - Practical | 1. Able to simulate and test behaviour of system. |
|             |                                    | 2. Ability to use various hardware interface with graphical programming language. |
|             |                                    | 3. Develop basic application in lab view graphical programming environment. |
|             |                                    | 4. Acquire date with Lab view and interfacing different instruments. |
|             |                                    | 5. Create applications using a state machine design platform. |
|             |                                    | 6. Explore use of graphs and charts and build a user interface. |
| 28. 17ECU613B | Verilog And FPGA Based System Design - Practical | 1. Understand the feedback topologies involved in the amplifiers. |
|             |                                    | 2. Create, synthesize and simulate various digital circuits. |</p>
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<tbody>
<tr>
<td>3.</td>
<td>Design and model digital circuits with verilog HDL at behavioural, structural and RTL levels.</td>
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<tr>
<td>4.</td>
<td>Develop test benches to stimulate combinational and sequential circuits.</td>
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<td>5.</td>
<td>Design the combinational and sequential digital circuits by Verilog HDL</td>
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<tr>
<td>6.</td>
<td>Analyse the frequency response of different configurations of a amplifier</td>
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</table>
Name of the Department: **Management**

**Course:** BBA

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1.     | 17BAU501A   | Investment Analysis and Portfolio      | 1. Understand the determinants and behaviour of asset prices,  
                                                     2. Exhibit the financial theory and the analytical tools needed to make good investment decisions, and to model the relationship between risk and return, optimal portfolio selection.  
                                                     3. Characterize the implications of the market efficiency evidence on active portfolio management.  
                                                     4. Analyse the EIC framework make decisions based on investing in different avenues.  
                                                     5. Critically evaluate the risk return parameters and select the best alternative.  
                                                     6. Communicate in written form and prepare report.                                                                                      |
|        |             | Management                             |                                                                                                                                                                                                                  |
| 2.     | 17BAU501B   | Investment Banking and Financial Services | 1. Understand the General structure of various institutional structure  
                                                     2. Develop and employ theoretical valuation methods to price these financial instruments.  
                                                     3. Exhibit the importance of credit rating agency  
                                                     4. Apply financial concepts, theories and tools in financial decision making.  
                                                     5. Evaluate the legal, ethical and economic environment related to financial services.  
                                                     6. Acquire the skills necessary to participate in managing a financial services company.                                                                 |
| 3.     | 17BAU502A   | Advertising and Brand Management       | 1. Analyze advertising and branding techniques and apply them to a variety of different issues;  
                                                     2. In calculate and prepare presentations on advertising and brand management issues.  
                                                     3. Examine knowledge in development and management of customer-based brand equity.  
                                                     4. Examine advertising and its functions in relation to brand success  
                                                     5. Evaluate the criteria for the best advertisements and brands and apply in lifelong practice.  
                                                     6. Work in teams and exhibit leadership skills.                                                                                         |
| 4.     | 17BAU502B   | Retail Management                      | 1. Assess the understand the ways that retailers use marketing tools and techniques.  
                                                     2. Develop an in-depth understanding of retail and services management as well as non-store retailing.  
                                                     3. Use foundational skills knowledge to remain current with marketing and management strategies and trends and employ them in new business environments.  
                                                     4. Understand the functions of retail business and various retail formats and retail channels.                                                |
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<td>5.</td>
<td>17BAU503A</td>
<td>Taxation - I</td>
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<td>5.</td>
<td>Exhibit the knowledge of design, implementation, and assessment of retailing strategies based on consumer needs.</td>
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<td>6.</td>
<td>Critically analyse and evaluate the criteria for the functioning of the retail store and growth of retail sector in India</td>
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<td>6.</td>
<td>17BAU503B</td>
<td>Company Law and Secretarial Practice</td>
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<tr>
<td>1.</td>
<td>Understand the income tax laws in India and be able to do tax planning.</td>
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<td>2.</td>
<td>Interpret and exhibit the assessment procedure of individuals and computation of tax liability.</td>
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<td>3.</td>
<td>Formulate the Income Tax calculations by critically analyzing the assessee’s situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee</td>
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<td>4.</td>
<td>Comprehend on the assessment of the GST</td>
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<td>5.</td>
<td>Communicate orally and in written form the income tax, GST and customs law and computations of IT.</td>
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<td>6.</td>
<td>Understand with the laws pertaining to the Income Tax and apply it lifelong.</td>
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<td>7.</td>
<td>17BAU504A</td>
<td>Entrepreneurship Development</td>
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<tr>
<td>1.</td>
<td>Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>2.</td>
<td>Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</td>
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<tr>
<td>3.</td>
<td>Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</td>
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<td>4.</td>
<td>Exhibit with the skills of entrepreneur</td>
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<td>5.</td>
<td>Preparation and evaluation of business plan and Project formulations</td>
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<td>6.</td>
<td>Develop and implement advanced knowledge and skills of project and programme management in establishing a new enterprise.</td>
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<td>8.</td>
<td>17BAU504B</td>
<td>Production and Operations Management</td>
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<tr>
<td>1.</td>
<td>Analyze the entire process of manufacturing a product or a service</td>
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<td>2.</td>
<td>Understand the concept of optimum utilization of resources and minimization of cost</td>
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<td>9.</td>
<td>17BAU601A</td>
<td>HRD: Systems and Strategies</td>
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<td>10.</td>
<td>17BAU601B</td>
<td>Management of Industrial Relations</td>
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<td>11.</td>
<td>17BAU602A</td>
<td>Global Business Environment</td>
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<td>12.</td>
<td>17BAU602B</td>
<td>International Trade Policy and Strategy</td>
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<td>13.</td>
<td>17BAU603A</td>
<td>Taxation - II</td>
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<td>6. Apply the understanding of Export, EXIM strategies, custom clearance and Export incentive schemes.</td>
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<td></td>
<td></td>
<td>1. Interpret the concepts in central sales tax and VAT</td>
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<td>2. Computation of taxation with procedures</td>
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<td>3. Infer knowledge in central and customs act</td>
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<td>4. Analyse and evaluate the effect of an indirect tax on consumers and producers.</td>
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<td>5. Gain expert knowledge of the principles of the indirect tax laws and the relevant rules.</td>
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<td>6. Understand various concepts of Goods &amp; Service Tax</td>
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<td>14.</td>
<td>17BAU603B</td>
<td>Strategic Management</td>
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<td></td>
<td>1. Understand the strategic decisions that organisations make and have an ability to engage in strategic planning.</td>
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<td>2. Exhibit the strategic management practices used by top management</td>
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<td>3. Analyze the matrix in strategic management</td>
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<td>4. Impart and implement strategic principles and practice</td>
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<td>5. Exhibit the basic concepts, principles and practices associated with strategy formulation and implementation</td>
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<td>6. Understand the principles of strategy formulation, implementation and control in organizations</td>
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<td>15.</td>
<td>17BAU691</td>
<td>Project</td>
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<tr>
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<td></td>
<td>1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.</td>
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<td>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</td>
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<td>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</td>
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<td>4. Apply the theoretical and practical learning of doing research into lifelong practice.</td>
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<td>5. Communicate in oral and written form and prepare report</td>
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<td></td>
<td>6. Work in team and exhibit leadership skills</td>
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<tr>
<td>16.</td>
<td>18ENU301</td>
<td>English – III</td>
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<td></td>
<td></td>
<td>1. Students learnt the basics and purposes of listening skill.</td>
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<td>2. Students will know the importance of speaking.</td>
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<td>3. Students developed the speaking skills on telephone, business and also in travel</td>
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<td>4. Learnt some effective vocabulary learning strategies.</td>
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<td>5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.</td>
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<td>6. Students will have honed the skills of communication which is needed for business purpose.</td>
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<td>17.</td>
<td>18BAU301</td>
<td>Principles of Marketing</td>
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<tr>
<td></td>
<td></td>
<td>1. Understand the Concept of marketing, and 4Ps of Marketing</td>
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<td>No.</td>
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<tr>
<td>18</td>
<td>18BAU302</td>
<td>Management Accounting</td>
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<tr>
<td>20</td>
<td>18BAU303B</td>
<td>Management Information System</td>
</tr>
<tr>
<td>21</td>
<td>18BAU311</td>
<td>Principles of Marketing</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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</table>
| 22. 18BAU312 | Management Accounting (Practical) | 1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.  
2. Comprehend on the contemporary issues relevant to accounting concepts.  
3. Analyse the alternatives using appropriate tools and techniques.  
4. Solve the problems and take decisions based on the result.  
5. Communicate orally and in written form the concepts and solutions.  
6. Demonstrate the distribution management or the selected company. |
| 23. 18BAU313A | Human Resource Management (Practical) | 1. Understand the concept of the Human resource management and HR practices in real organization.  
2. Analyse the case studies, HR process and apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives methods for HR practices and select the best methods suiting the situation.  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills  
6. Evaluate the reasons for grievances and able to draw a solution |
| 24. 18BAU313B | Management Information System (Practical) | 1. Understand the usage of information system in management decision.  
2. Critically analyse and evaluate the use of DSS, AI in supporting management decision  
3. Communicate orally and in written form the understanding of the usage of information system in management decision.  
4. Understand the security and ethical issues pertaining to use of information technology in management decision making.  
5. Apply the understanding of the usage of information system in management decision lifelong practice.  
6. Evaluate the performance of E - Governance in a state. |
| 25. 18ENU401 | English – IV                     | 1. Students have acquired proficiency in communication.  
2. Students have become adept in written communication and presentation skills. |
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<tr>
<td>3.</td>
<td>Practice the skill of writing in English and that of public speaking.</td>
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<td>4.</td>
<td>Establish and maintain social relationships.</td>
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<td>5.</td>
<td>Develop communication skills in business environment.</td>
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<td>6.</td>
<td>Refine communication competency through LSRW skills.</td>
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<td>26.</td>
<td>18BAU401</td>
<td>Business Research Methods</td>
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<tr>
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<td>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</td>
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<td>2. Analyse the research problem and design the blueprint to capture data and analyse the same using appropriate statistical techniques and apply the learning lifelong.</td>
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<td>3. Critically formulate the research design and sampling design suitable for the problem.</td>
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<td>4. Communicate orally and written for the research problem, research design, sampling techniques.</td>
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<td>5. Design a report to communicate the findings and suggestion to make business decision</td>
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<td>6. Apply the statistical tools for analysis and interpret</td>
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<td>27.</td>
<td>18BAU402</td>
<td>Financial Management</td>
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<tr>
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<td>1. Apply the Concept of financial management by effective use of working capital</td>
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<td>2. Analyse the capital budgeting decisions using appropriate tools and techniques.</td>
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<td>3. Assess the different leverage and dividend policies.</td>
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<td>4. Communicate orally and in written form the concepts and solutions.</td>
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<td>5. Analyse cases in a team and exhibit leadership skills.</td>
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<td>6. Understand the concept of capital structure and cost of capital</td>
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<td>28.</td>
<td>18BAU403A</td>
<td>Financial Analysis and Reporting</td>
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<td>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</td>
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<td>2. Understand and examine tools and techniques to analyse the financial statement analysis.</td>
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<td>3. Evaluate the results of the tools applied, interpret the result.</td>
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<td>4. Access the financial statement with the use ratio analysis and interpret the results.</td>
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<td>5. Recognize the uses and importance of financial statement</td>
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<td>6. Measure the financial ratios to meet the corporate objectives</td>
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<td>29.</td>
<td>18BAU403B</td>
<td>Decision making using SPSS</td>
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<td>1. To understand the Importance of SPSS and the features for in SPSS</td>
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<td>2. To apply descriptive analytical tools available in SPSS and its appropriate application and interpretation.</td>
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<td>3. To examine the univariate tools available in SPSS and its appropriate application and interpretation.</td>
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<td>Course Title</td>
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</table>
| 30  | 18BAU411     | Business Research Methods (Practical)       | 1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing  
2. Analyse the research problem and design the instruments to capture data  
3. Access the sampling design using appropriate statistical techniques, and apply the learning lifelong.  
4. Evaluate the appropriate scales and measurement to be used for capturing data.  
5. Design a report to communicate the findings and suggestion to make business decision  
6. Apply the statistical tools for analysis and interpret |
| 31  | 18BAU412A    | Financial Analysis and Reporting (Practical) | 1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.  
2. Understand and examine tools and techniques to analyse the financial statement analysis.  
3. Evaluate the results of the tools applied, interpret the result.  
4. Access the financial statement with the use ratio analysis and interpret the results.  
5. Recognize the uses and importance of financial statement  
6. Measure the financial ratios to meet the corporate objectives |
| 32  | 18BAU412B    | Decision making using SPSS (Practical)      | 1. Create datasheet and enter the data  
2. Compute descriptive statistics using the package and graphically represent the data.  
3. Perform univariate and bivariate analysis in the software package.  
4. Perform multivariate analysis in the software package.  
5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.  
6. To understand the Importance of SPSS and the features for in SPSS |
| 33  | 19LAU101     | Language - I                                | 1. குறிப்பிட்டு வந்துவிளக்கும் பாடல் பொருளாய் விளக்கம் விளக்கம் பொருளாய் விளக்கம் விளக்கம் விளக்கம், குறிப்பிட்டு வந்துவிளக்கும் பாடல் பொருளாய் விளக்கம் விளக்கம் விளக்கம் விளக்கம், குறிப்பிட்டு வந்துவிளக்கும் பாடல் பொருளாய் விளக்கம் விளக்கம் விளக்கம்.  
2. குறிப்பிட்டு வந்து, வலைக்கானகாள்ளப் பொருள் விளக்கம் விளக்கம் விளக்கம் விளக்கம் விளக்கம் விளக்கம் விளக்கம் விளக்கம்.
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<tr>
<td>34.</td>
<td>19ENU101</td>
<td>English – I</td>
</tr>
<tr>
<td>35.</td>
<td>19BAU101</td>
<td>Fundamentals of Management and Organizational Behaviour</td>
</tr>
<tr>
<td>36.</td>
<td>19BAU102</td>
<td>Business Accounting</td>
</tr>
<tr>
<td>37.</td>
<td>19AEC101</td>
<td>Business Communication</td>
</tr>
</tbody>
</table>

### 34. 19ENU101 English – I

1. Develop the knowledge of interpersonal skills.
2. Establish and maintain social relationships.
3. Genres of literature will give moral values of life.
4. Develop communication skills in business environment
5. Communication skills will get developed.
6. Develop to have language competence

### 35. 19BAU101 Fundamentals of Management and Organizational Behaviour

1. Understand the concepts of management and the functions of management.
2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.
3. Assess the impact of the personality traits and their perception in day to day performance.
4. Exhibit the leadership skills whenever required and work in groups and teams by motivating and resolving conflict arising in groups and adapting to change.
5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.
6. Exhibit the changes in organization and tactics in managing conflict

### 36. 19BAU102 Business Accounting

1. Comprehend the accounting concepts, principles and to comply the accounting standards.
2. Understand the difference between capital and revenue expenditure.
3. Prepare the final accounts.
4. Calculate the asset depreciation using different methods
5. Evaluate the inventory value using different methods.
6. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the accounting discipline.

### 37. 19AEC101 Business Communication

1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.
2. Draft business correspondence for the organization requirement.
3. Prepare business reports for organization needs and use appropriate technology for business communication.
4. Draft the resume and develop skills to face the interview.
5. Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.
6. Understand the essential of usage of technology

<table>
<thead>
<tr>
<th>38.</th>
<th>19BAU111</th>
<th>Fundamentals of Management and Organizational Behaviour (Practical)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Understand the concepts of management and the functions of management.</td>
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<td>2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.</td>
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<td>3. Assess the impact of the personality traits and their perception in day to day performance.</td>
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<td>4. Exhibit the leadership skills whenever required and work in groups and teams by motivating and resolving conflict arising in groups and adapting to change.</td>
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<td>5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</td>
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<td>7. Exhibit the changes in organization and tactics in managing conflict</td>
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<th>39.</th>
<th>19BAU112</th>
<th>Financial software package (Practical)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Understand the different accounting heads and its importance</td>
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<td>2. Create vouchers by understanding the reason for posting under different heads</td>
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<td>3. Calculate valuation of assets using the software</td>
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<td>4. Prepare the financial statements and retrieve ratios</td>
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<td>5. Creating backup and ensuring the accuracy of the accounting data</td>
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<td>6. Communicate the output derived.</td>
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<th>40.</th>
<th>19LAU201</th>
<th>Language – II</th>
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<tr>
<td></td>
<td></td>
<td>1. Learn to enjoy the ecstasy of literature.</td>
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<th>41.</th>
<th>19ENU201</th>
<th>English – II</th>
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<tr>
<td></td>
<td></td>
<td>1. Learn to enjoy the ecstasy of literature.</td>
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</table>
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

<table>
<thead>
<tr>
<th>42.</th>
<th>19BAU201</th>
<th>Managerial Economics</th>
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<tbody>
<tr>
<td>1.</td>
<td>Apply the demand and supply concept in managerial decisions</td>
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<tr>
<td>2.</td>
<td>Calculate the Cost, Revenue and breakeven point and apply it in decision making process.</td>
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<tr>
<td>3.</td>
<td>Formulate the pricing strategies based on the market structure.</td>
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<tr>
<td>4.</td>
<td>Gain familiarity on the macro level business components like money, banking, monetary policy, fiscal policy, trade, business cycles and balance of payments and make business decision based on the Macroeconomic indicators, inflation and business cycle and understand the impact of monetary policy, money supply and Balance of payments on running a business.</td>
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<tr>
<td>5.</td>
<td>Demonstrate capabilities as problem-solving, critical thinking, and communication skills.</td>
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<tr>
<td>6.</td>
<td>Understand the functions of commercial bank and theories of interest.</td>
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<th>43.</th>
<th>19BAU202</th>
<th>Business Mathematics and Statistics</th>
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<tbody>
<tr>
<td>1.</td>
<td>Apply the demand and supply concept in managerial decisions</td>
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<td>2.</td>
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<tr>
<th>44.</th>
<th>19AEC201</th>
<th>Environmental Studies</th>
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<tbody>
<tr>
<td>1.</td>
<td>Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</td>
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<tr>
<td>2.</td>
<td>Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.</td>
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<tr>
<td>3.</td>
<td>Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</td>
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<td>4.</td>
<td>Understand the transnational character of environmental problems and ways of addressing</td>
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|   | them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.  
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners. |
| 45. | 19BAU211 Managerial Economics (Practical) | 1. Understand the concept of the micro and macroeconomic concepts and its application in business  
2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.  
3. Critically evaluate the appropriate alternatives and draw a solution.  
4. Communicate in oral and written form and prepare report  
5. Work in team and exhibit leadership skills  
6. Analysis the cost and revenue function based on the cost of production |
<table>
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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.     | 19MBAP101   | **Fundamental of Management and Organizational Behaviour** | 1. Understand the concepts of management and the functions of management.  
2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.  
3. Assess the impact of the personality traits and their perception in day to day performance.  
4. Exhibit the leadership skills whenever required and work in groups and teams by motivating and resolving conflict arising in groups and adapting to change.  
5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.  
6. Understand the management function and roles of the manager and become an effective planner and decision maker. |
| 2.     | 19MBAP102   | **Business Communication** | 1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.  
2. Draft business correspondence for the organization requirement.  
3. Prepare business reports for organization needs.  
4. Use appropriate technology for business communication.  
5. Draft the resume and develop the skills to face the interview  
6. Understand the concept of Group Discussions and Interviews |
| 3.     | 19MBAP103   | **Managerial Economics** | 1. Apply the economic way of thinking to individual decisions and business decisions  
2. Measure the responsiveness of consumers' demand to changes in the price of a goods or service, and understand how prices get determined in markets,  
3. Understand the different costs of production and how they affect short and long run decisions and derive the equilibrium conditions for cost minimization and profit maximization  
4. Demonstrate an understanding of monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run and Critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.  
5. Understand and exhibit the communication skills to convey the thoughts and ideas of case analysis to the individuals and group.  
6. Demonstrate an understanding of monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run. |
| 4.     | 19MBAP104   | **Legal Aspects of Business** | 1. Analyze the nature of contract law, Company law and cyber laws and its application in business.  
2. Assess the legal forms of business organization and its
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<td>5.</td>
<td>19MBAP105</td>
<td>Accounting for Managers</td>
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<td></td>
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<td>1. Understand the accounting standards and realize the difference in the GAAP and IFRS.</td>
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<td>2. Ability to prepare, read, interpret and analyze financial statements to assess the financial performance and position of accompany;</td>
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<td>3. Understand and apply cost concepts to analyze common business management decisions such as pricing and outsourcing decisions from a financial perspective;</td>
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<td>4. Understand the importance and application of budgeting in organizational planning and control.</td>
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<td>5. Explain how financial transactions are processed through the accounting information system each accounting period</td>
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<td>6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the accounting decisions.</td>
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<td>6.</td>
<td>19MBAP106</td>
<td>Statistics for Decision Making</td>
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<td>1. Understand the basic statistical tools and techniques and its application in business decision-making.</td>
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<td>2. Perform basic statistical estimation and hypothesis testing for interpret the results.</td>
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<td>3. Know how to specify, estimate, and use statistical models to predict and obtain reliable forecasts.</td>
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<td>4. Develop an ability to analyze and interpret the collected data to provide meaningful information in making management decisions</td>
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<td>5. Develop skills to design business model and Analytics projects</td>
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<td>6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the discipline of statistics.</td>
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<td>7.</td>
<td>19MBAP111</td>
<td>MS Office and Tally (Practical)</td>
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<td></td>
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<td>1. Create new word documents using inbuilt features like tables, charts and references.</td>
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<td>2. Create a datasheet from collected data and analyses the data using inbuilt functions and tools.</td>
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<td>3. Design a presentation using animation, special effects and graphics.</td>
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<td>4. Utilize the Internet Web resources for communication.</td>
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<td>5. Create the vouchers and prepare the company’s final account and reports.</td>
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<td>6. Stimulate their Critical thinking by designing and developing clean and lucid writing skills.</td>
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<td>8.</td>
<td>19MBAP112</td>
<td>Case Analysis and Presentation</td>
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<td>1. Understand the utilization of SWOT tools in analyzing the situation</td>
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<td>2. Develop the analytical and critical thinking skills</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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| 18MBAP301   | Corporate Strategy | 1. Demonstrate a critical understanding of strategic management theories and apply lifelong.  
2. Apply quantitative and qualitative tools to evaluate and control  
3. Formulate appropriate strategies for companies.  
4. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills  
5. Communicate effectively strategic evaluation and control techniques  
6. Understand the concept of Quantitative and Qualitative tools in Strategy Evaluation and Control |
| 18MBAP302   | International Business | 1. Comprehend the concepts of International business, trade procedures and Exim Policy apply lifelong  
2. Understand the basics of shipment, foreign trade and international agencies and agreement.  
3. Demonstrate capabilities of analysing problems, team work and communication skills  
4. Develop knowledge on international financial institutions  
5. Acquire knowledge on foreign trade.  
6. Understand Financing of foreign trade and Documentation |
| 18MBAPF303A | Investment Analysis and Portfolio Management | 1. Understand the Concept of investing and mechanics for formulating investment decisions.  
2. Apply the investing concepts and skills lifelong.  
3. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills  
4. Demonstrate knowledge and compute value of security analysis & portfolio management and apply the concept to Evaluate the business proposal applying capital budgeting techniques  
5. Understand about SAPM. Investments’, its types, risk involved in investments’, analysis pertaining to investments, Portfolio Theory and models on investment management.  
6. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm. |
| 18MBAPF303B | Financial Markets and Services | 1. Understand the features and functioning of the financial markets and financial services operations and apply lifelong.  
2. Communicate orally and in written form the features and functioning of the financial markets and financial services operations.  
3. Demonstrate capabilities of analysing problems, team work and communication skills  
4. To give them an overview about insurance market  
5. To gain a comprehensive knowledge on the procedural formalities in dealing with different types of customers. |
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<th>No.</th>
<th>Code</th>
<th>Course Title</th>
<th>Module</th>
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</table>
| 13  | 18MBAPF303 C | Project Appraisal and Finance | 1. Understand the fundamentals of projects, project appraisal, risk management and project management and apply lifelong.  
2. Perform the feasibility study to decide on the project selection.  
4. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills  
5. Apprehend different level of project appraisal to run the business  
6. Understand the concept of Performance Audit and Project Leadership |
| 14  | 18MBAPM30 3A | Services Marketing           | 1. Understand the Services, marketing of services, marketing mix, pricing and segmentation for services marketing.  
2. Comprehend on the consumer behaviour of services sector and emerging issues in services sector.  
3. Evaluate the Gap in services sector using tools and techniques.  
4. Demonstrate capabilities of analysing problems, team work and communication skills  
5. Understand the role of marketing strategic business in service sector  
6. Gain knowledge on operations and financial aspects in market and retail planning |
| 15  | 18MBAPM30 3B | Integrated Marketing Communication | 1. Understand the concept of integrated marketing communication, understanding communication process and digital marketing and apply lifelong.  
2. Develop advertisement by selecting appropriate media.  
3. Understand the ethical standards related to advertising.  
4. Demonstrate capabilities of analysing problems, team work and communication skills  
5. Gain knowledge in Planning and development of creative marcom  
| 16  | 18MBAPM30 3C | Retail Management            | 1. Understand the Concept of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing.  
2. Communicate orally and in written form the understanding of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing.  
3. Apply the understanding of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing in lifelong practice.  
4. Demonstrate capabilities of analysing problems, team work and communication skills.  
5. Explain the concept of strategic planning within the retail management decision process  
6. To know the various Retail Inventory Planning, Return on Inventory Investments and Stock Turnover |
| 17. | 18MBAPH30 3A | Industrial Relations and Labour Welfare | 1. Comprehend on industrial relations, industrial conflicts, employee discipline, collective bargaining and industrial safety.  
2. Apply the legal aspects of industrial relations, industrial conflicts, employee discipline, collective bargaining and industrial safety lifelong.  
3. Demonstrate capabilities of analysing problems, teamwork and communication skills.  
4. Gain knowledge of Industrial safety, Occupational hazards  
5. Demonstrate knowledge of Statutory welfare measures – Welfare Funds – Education and training schemes  
6. Know about the Education and training schemes |
| 18. | 18MBAPH30 3B | Compensation and Benefits Management | 1. Understand the fundamentals of Wages, Salary, incentives, Compensation and pay scale systems and apply lifelong.  
2. To comprehend on the ethical laws related to compensation management.  
3. Critically evaluate, select the suitable methods and design the Pay structure.  
4. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills  
5. Understand the Compensation plans provided by Public sectors & Private Sectors  
6. Get knowledge of Incentives and Retirement plans |
| 19. | 18MBAPH30 3C | Strategic HRM | 1. Understand the transformation in the role of HR functions from being a support function to strategic function and apply lifelong.  
2. Explore the relationship between the management of people and pursuit of an organisation's strategic goals and objectives.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, problem-solving, planning and team work.  
4. Understand and apply the appropriate employee relations measures and strategic HRM Concept  
5. Understand the HRM functions and latest developments in the field of HR and effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to different audiences  
6. Gain knowledge in reward strategy and employee relations strategy |
2. Evaluate the need of ERP for an organization, select the best vendor and implement the module that is appropriate for the organization need.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work. |
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<td>Apprehend application</td>
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<td>of different Sales and</td>
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<td>of Data definition</td>
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<td>Distribution tools for</td>
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<td>Understand the concept</td>
<td>Apply appropriate tools</td>
<td>Utilize problem solving</td>
<td>Apply software testing</td>
<td>Exhibit behaviour and</td>
<td>Produce quantitative</td>
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<td>and techniques to</td>
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<td>and project planning,</td>
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<td>the project.</td>
<td>ensure software</td>
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<td>specialist software</td>
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<td>estimation, scheduling,</td>
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<td>enhanced competence in</td>
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<td>decision-making, group</td>
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<td>Understand E-Marketing,</td>
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<td>ecommerce models,</td>
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<td>Absorption, development</td>
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<td>Understand the social</td>
<td>Analyse the real cases</td>
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<td>entrepreneurship,</td>
<td>of social entrepreneurship and understand the dynamics of social entrepreneurship.</td>
<td>performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.</td>
<td>opportunities for new technologies</td>
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</table>
4. Generate innovative ideas and find ways to apply these ideas to solve issues and problems in different industries and settings.
5. Analyze the role of government in business
6. Maintain ethical standards in individual and business life

25. 18MBAPE303
C Venture Capital and Private Equity
1. Understand the venture capital, private equity, structure, regulatory aspects of VC/PE investments, Valuation models, strategies, exit strategies for P/E and apply learning lifelong.
2. Evaluate and select the best alternative applying the valuation models.
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, problem-solving, planning and team work.
4. Understand Strategies of Private Equity
5. Gain knowledge in Valuation approaches
6. Evaluate Exit strategies for Private Equity

26. 18MBAPB303
A Planning, Structuring, and Financing Small Business
1. Understand the characteristic and problems of Small business.
2. Comprehend on the government initiative for the small business, Institutional support and schemes available for the support of small scale industry.
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, problem-solving, planning and team work.
4. Demonstrate knowledge on the ways of Development bank and regulators support for small business
5. Apprehend different level of Institutional Support Schemes to run the business
6. Maintain ethical standards in individual and business life

27. 18MBAPB303
B Finance and Accounting for Small Business:
1. Understand the concept of bookkeeping, budgeting, capital budgeting, financing options and financial analysis tools and apply the learning lifelong in small business operations.
2. Select the appropriate tools and techniques and solve problems to select the best alternative.
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, problem-solving, planning and team work.
4. Apprehend application of Basic Control Systems
5. Know the Business benefits of Zero Working Capital and Zero Fixed Assets
6. Understand the concept of Performance Measurement Systems

28. 18MBAPB303
C Marketing for Small Business
1. To Understand the concept of scanning marketing environment, product mix, pricing, promotion and place and apply the learning lifelong in small business.
2. To select the appropriate product mix, formulate the best pricing, promotion strategies for the chosen small business target segment.
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group
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<tr>
<td><strong>leadership, oral and written communication, critical thinking, analysing, planning and team work.</strong></td>
<td>4. Understanding the Promotion and Distribution Strategies</td>
<td>5. Analyse Emerging marketing environment in India.</td>
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<td>6. Understand Rural Marketing, Marketing Research concepts and Techniques</td>
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<td><strong>29. 18MBAPA30 3A</strong></td>
<td><strong>Data Mining and Data warehousing</strong></td>
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<tr>
<td>1. Understand the basic principles, concepts and applications of data warehousing and data mining,</td>
<td>2. Comprehend the importance of Processing raw data to make it suitable for various data mining algorithms.</td>
<td>3. Visualize the techniques of clustering, classification, association finding, feature selection and its importance in analysing the real-world data.</td>
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<td>4. Understand the Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment</td>
<td>5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.</td>
<td>6. Understand Preliminary analysis of the data set using traditional query tools</td>
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<tr>
<td><strong>30. 18MBAPA30 3B</strong></td>
<td><strong>Data Visualization for Managers – Using R and Tableau</strong></td>
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<tr>
<td>1. Understand the basics of data visualization</td>
<td>2. Design visualizations that represent the relationships contained in complex data sets and adapt them to highlight the ideas you want to communicate.</td>
<td>3. Formulate and use appropriate models of data analysis to answer business-related questions.</td>
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<td>4. Interpret data findings effectively to any audience, orally, visually and in written formats.</td>
<td>5. Learn to use colors, shapes, and other tools to dig deep into data</td>
<td>6. Create Maps &amp; How to build interactive web pages</td>
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<tr>
<td><strong>31. 18MBAPA30 3C</strong></td>
<td><strong>Machine Language</strong></td>
<td></td>
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<tr>
<td>1. Understand the basics of machine language</td>
<td>2. Apply the predictive analytics modeling</td>
<td>3. Evaluate the best decisions applying the basic probabilistic, supervised learning, unsupervised learning and deep learning</td>
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<tr>
<td>4. Formulate and use appropriate models of data analysis to answer business-related questions.</td>
<td>5. Interpret and communicate data findings effectively to any audience, orally, visually and in written formats.</td>
<td>6. Gain knowledge in Automate Feature Extraction using Deep Learning</td>
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<td><strong>32. 18MBAPI303 A</strong></td>
<td><strong>International Economics</strong></td>
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<tr>
<td>1. Understand the concept of international economics, globalization, comparative advantage theories, international macroeconomic indicators like foreign exchange, national income, balance of payment and international macroeconomic policy.</td>
<td>2. Gain the knowledge and analyze the emerging global trends in business environment.</td>
<td>3. Develop insight on exchange of exports and imports</td>
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<td>4. Analyze the impact of exchange rate fluctuation on home currencies</td>
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<td>5.</td>
<td>Evaluate the policies pursued by various economic bodies in international trade</td>
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<td>6.</td>
<td>Get familiarize with the export promotion measures and their benefits to their business</td>
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| 37. | 18MBAPO30 3C | Total Quality Management                          | 1. Obtain the knowledge of applying a quality management TQM tools to improve organizational effectiveness.  
2. Acquire required diagnostic skills and use various quality tools.  
3. Get exposure on tools and techniques like six sigma, 7 old quality control  
4. Familiarize about the Quality Management System.  
5. Apply the Quality tools and techniques in improving the performance.  
6. Understand the concept of quality management (QM), QM Principles, tools and techniques and quality systems. |
| 38. | 18MBAPT303 A | Tourism Principles, Policies and Practices        | 1. Comprehend on the potential of tourism industry in India;  
2. Understand the various elements of Tourism Management;  
3. Familiarize with the Tourism policies in the national and international context.  
4. Apply the knowledge of tourism principles, policies and practices lifelong.  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
6. Understand Overview of Five Year Plans |
| 39. | 18MBAPT303 B | Tourism Products of India                         | 1. Understand the vast Tourist resources of India;  
2. Conceptualize a tour itinerary based on variety of themes  
3. Identify and understand the features of emerging tourist destinations all over the world  
4. Apply the knowledge of tourism resources, importance of tourist destination lifelong.  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
6. Understand Emerging Tourism Destinations of India |
| 40. | 18MBAPT303 C | Recreation Management                             | 1. Understand the dynamics of recreation products and their significance for tourism industry;  
2. Comprehend with the theoretical and practical issues of recreation management;  
3. Understand the marketing trends in recreation.  
4. Apply the understanding of recreation products, recreation management and marketing recreation lifelong  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work. |

3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
4. Understand the principles and techniques of Operations Research and their applications  
5. Understand why Capacity strategy and Purchasing and supply strategy  
6. Understand the importance of Formulation and implementation strategy.  

1. Obtain the knowledge of applying a quality management TQM tools to improve organizational effectiveness.  
2. Acquire required diagnostic skills and use various quality tools.  
3. Get exposure on tools and techniques like six sigma, 7 old quality control  
4. Familiarize about the Quality Management System.  
5. Apply the Quality tools and techniques in improving the performance.  
6. Understand the concept of quality management (QM), QM Principles, tools and techniques and quality systems.  

1. Comprehend on the potential of tourism industry in India;  
2. Understand the various elements of Tourism Management;  
3. Familiarize with the Tourism policies in the national and international context.  
4. Apply the knowledge of tourism principles, policies and practices lifelong.  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
6. Understand Overview of Five Year Plans  

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3. Identify and understand the features of emerging tourist destinations all over the world  
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3. Understand the marketing trends in recreation.  
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3. Understand the marketing trends in recreation.  
4. Apply the understanding of recreation products, recreation management and marketing recreation lifelong  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
6. Understand Emerging Tourism Destinations of India
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<th>Units</th>
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<tbody>
<tr>
<td>41</td>
<td>18MBAP321</td>
<td>Internship</td>
<td>6</td>
<td>Gain knowledge in Environmental perspectives on coastal recreation and tourism</td>
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<td>1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.</td>
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<td>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</td>
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<td>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</td>
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<td>4. Apply the theoretical and practical learning of doing research into lifelong practice.</td>
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<td>5. Communicate in oral and written form and prepare report</td>
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<td>6. Understand the concept of organizational study</td>
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<td>42</td>
<td>19MBAP201</td>
<td>Production and Operations Management</td>
<td>6</td>
<td>Understand the core features of the operations and production management function at the operational and strategic levels.</td>
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<td>1. Understand the core features of the operations and production management function at the operational and strategic levels.</td>
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<td>2. Evaluate and decide the best plant and factory location and layout.</td>
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<td>3. Forecast the requirement and make accurate production planning, inventory planning and schedule the production.</td>
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<td>4. Obtain the knowledge of applying a quality management TQM tools to improve organizational effectiveness.</td>
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<td>5. Effectively communicate ideas, explain procedures in oral and written forms to different audiences.</td>
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<td>7. Creating and delivering products &amp; services to customers and improving process &amp; supply chain performance</td>
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<tr>
<td>43</td>
<td>19MBAP202</td>
<td>Marketing Management</td>
<td>6</td>
<td>Understand the core concepts of marketing and the role of marketing in business and society.</td>
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<td>2. Perform market analysis and identify the best marketing mix.</td>
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<td>3. Determine strategies for developing new products and services for the right target segment by conducting marketing research.</td>
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<td>4. Understand the latest trends in marketing and apply the ethical norms in marketing domain.</td>
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<td>5. Effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to the team members.</td>
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<td>8. Analyze the importance of consumer buying motives &amp; consumer behavior, Designing competitive strategies for Leaders</td>
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<td>44</td>
<td>19MBAP203</td>
<td>Human Resource Management</td>
<td>6</td>
<td>Assess the job analysis for a profile and understand its linkage with HR planning</td>
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<td>2. Evaluate the training needs and draft a training programme.</td>
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<td>3. Understand the compensation and reward system applicable to the industry based and understand its linkage with performance management</td>
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<td>4. Understand and apply the appropriate employee relations measures.</td>
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<td>5. Understand the HR functions and latest developments in the field of HR and effectively communicate ideas,</td>
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</table>
| 19MBAP204   | Quantitative Techniques | 1. Understand the principles and techniques of Operations Research and their applications indecision-making.  
2. Realize and apply mathematical techniques for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.  
3. Formulate linear programming (LP) models and understand the cost minimization and profit maximization concepts.  
4. Select the best strategy on the basis of decision criteria under the uncertainty.  
5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills.  
6. Understand Dynamic Programming |
| 19MBAP205   | Financial Management | 1. Understand the role of a financial manager, and their role in taking decisions professionally.  
2. Demonstrate knowledge and compute value of money over time and apply the concept to Evaluate the business proposal applying capital budgeting techniques  
3. Compute the cost of capital and financial leverage to estimate the optimal capital structure.  
4. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.  
5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions.  
6. Develop analytical skills which facilitate the financial decision making in business situations |
| 19MBAP206   | Research Methodology for Management | 1. Assess the best suitable research type and formulate the research objective for the business problem.  
2. Formulate the suitable research designs and select appropriate sampling techniques for the research.  
3. Select the appropriate data collection method for solving the business issue and decide the appropriate measurement scale for designing the instrument for data collection.  
4. Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.  
5. Demonstrate capabilities of team work, problem-solving, critical thinking, and communication skills and design a suitable research report based on the ethical norms of research.  
6. Understand Norms for Using Tables, Charts and Diagrams |
| 19MBAP211   | SPSS (Practical) | 1. Create datasheet and enter the data  
2. Compute descriptive statistics using the package and graphically represent the data.  
3. Perform univariate and bivariate analysis in the software package.  
4. Perform multivariate analysis in the software package. |
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<tr>
<td>49.</td>
<td>19MBAP212</td>
<td>Team Building and Leadership skills (Practical)</td>
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<tr>
<td></td>
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<td>5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.</td>
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<td>6. Do Multivariate analysis</td>
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<td></td>
<td>1. Apply facilitative leadership skills to promote team communication, collaboration, and performance.</td>
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<td>2. Gain Confidence and ability to deal effectively with challenging team situations.</td>
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<td>3. Ability to use ongoing evaluation and feedback tools to monitor team progress, tools for team problem-solving and goal attainment.</td>
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<td>4. Utilize teamwork tools that are used to align individuals to be as effective as team members.</td>
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<td>5. Receive and integrate feedback on decision-making practices, conflict resolution skills, and teamwork behaviors with the support of a team-based coach.</td>
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<td>6. Manage Conflict in Organization</td>
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<td>50.</td>
<td>18MBAP401</td>
<td>Indian Ethos and Business Ethics</td>
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<tr>
<td></td>
<td></td>
<td>1. Understand Indian ethos and values</td>
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<td></td>
<td></td>
<td>2. Appreciate the concepts of business ethics in leadership</td>
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<td>3. Analyze and resolve ethical dilemma</td>
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<td>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.</td>
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<td>5. Maintain Managing Ethical Dilemma</td>
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<td>6. Understand ethical issues related to business and good governance necessary for long term survival of business</td>
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<tr>
<td>51.</td>
<td>18MBAPF402 A</td>
<td>Banking and Insurance</td>
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<td></td>
<td></td>
<td>1. Understand the Concept of banking and insurance its history, products and regulatory body.</td>
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<td>2. Communicate orally and in written form the Concept of banking and insurance its history, products and regulatory body.</td>
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<td>3. Apply the Concept of banking and insurance, its products in lifelong practice.</td>
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<td>4. Demonstrate techniques of leasing provides new avenues in business</td>
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<td>5. Gain familiarity in hire purchase</td>
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<td>52.</td>
<td>18MBAPF402 B</td>
<td>Mergers, Acquisitions and Corporate Restructuring</td>
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<tr>
<td></td>
<td></td>
<td>1. Understand the Concept mergers, Demergers, LBO, MBO, JV its valuation and accounting.</td>
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<td>2. Compute, analyse and evaluate the corporate restructuring decisions and its impact on company.</td>
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<td>3. Communicate orally and in written form the understanding of mergers, Demergers, LBO, MBO, JV</td>
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<td>4. Understand the concessions under Income Tax Act for mergers and unwillingness to pay and inability to pay</td>
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<td>5. Gain knowledge in Valuation and accounting</td>
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<td>6. Understand Legal and Regulatory Framework of M &amp; A and Post Merger Integration</td>
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<td>53.</td>
<td>18MBAPF402 C</td>
<td>Financial Derivatives</td>
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<td>1. Understand the concept of derivative, derivative types as a hedging tool and application of derivative in India.</td>
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<td>2. Apply the understanding of derivative, derivative types as a hedging tool lifelong.</td>
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<td>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<tr>
<td>18MBAPF402D</td>
<td>Financial Econometrics</td>
<td>1. Understand the concept of econometrics and econometric modeling and apply it lifelong.</td>
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<td>2. Comprehend on the tools and techniques and apply the same for modeling the financial data.</td>
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<td>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, problem solving, planning and team work.</td>
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<td>4. Gain knowledge in Functional forms of regression models</td>
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<td>5. Understand Detection techniques and remedial measures in Multicollinearity</td>
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<td>6. Understand Model selection criteria</td>
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<tr>
<td>18MBAPM402A</td>
<td>New Product Development</td>
<td>1. To understand the concept of new product development process and apply it lifelong.</td>
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<td></td>
<td></td>
<td>2. To comprehend on the idea creation, development and testing techniques.</td>
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<td>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.</td>
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<td>4. Assess alternative business models</td>
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<td>5. Analyze the market, the competition and the buying behavior of consumers</td>
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<td>6. Understand Pricing Strategies and Testing of New Products</td>
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<td>Consumer Behaviour</td>
<td>1. Understand the importance of Culture, Subculture, Social Class, Reference Groups and Family Influences in Consumer Behaviour.</td>
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<td>2. Explore, analyse and compare the core theories of consumer behaviour and its application in both consumer and organizational markets</td>
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<td>3. AppraisemodelfsofConsumerBehaviouranddeterminetherelevancetoparticularmarketing situations</td>
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<td>4. Critique the theoretical perspectives associated with consumer decision making, including recognising cognitive biases and heuristics</td>
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<td>5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to investment decisions.</td>
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<td>6. Gain knowledge in Problem Recognition and Information Search</td>
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<tr>
<td>18MBAPM402B</td>
<td>Brand Management</td>
<td>1. Understand the basic Principles of branding and apply lifelong.</td>
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<td>2. Craft and evaluate brand strategies</td>
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<td>3. Evaluate brand extension and its contribution to parent brand</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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</table>
| 18MBAPM40 2D | Sales and Distribution Management | 4. Develop an understanding of brand equity and a range of performance related outcomes.  
5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to branding.
6. Measuring Brand Performance |
| 18MBAPH40 2A | Organizational Change and Development | 1. Understand the basic Principles of selling and distribution management.  
2. Design and forecast sales and sales budget.  
3. Formulate strategies to manage the sales force team.  
4. Understand the different distribution channels.  
5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to selling and distribution management.  
6. Gain knowledge in designing channel systems and channel management |
| 18MBAPH40 2B | Performance Management and Appraisal | 1. Understand and analyze different approaches to managing organizational change and understand and utilize the competencies required for effective change management at organization, group and individual levels.  
2. Devise effective intervention strategies and function as an internal HR consultant to an organization in transition.  
3. Critically evaluate, in an organizational development framework, the theoretical and practical links between development models  
4. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to organization change and development concepts.  
5. Understand creating support systems, managing transition and process-oriented strategies  
6. Design OD interventions |
| 18MBAPH40 2C | Competency Mapping | 1. Understand the process of competency mapping and profiling.  
2. Comprehend the integration of competency profiling to other HR applications and apply the learning lifelong.  
3. Differentiate the various types of competencies i.e. team competency, role competency.  
4. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to competency mapping. |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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</thead>
</table>
| 62. 18MBAPH40 2D | Talent Management | 1. Understand the concept, process of talent management and its linkages with selection, career development, employee engagement and retention.  
2. Apply the understanding of Understand the concept, process of talent management and its linkages with selection, career development, employee engagement and retention lifelong.  
3. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to talent management.  
4. Assess Comprehensive approach to Retaining employees  
5. Understand Contemporary Talent Management Issues, Challenges and Best Practices  
6. Gain knowledge in Designing Integrated Rewards, Sustainable Talent Management and Reward Model |
| 63. 18MBAPS402 A | Information Systems Audit and Control | 1. Understand the auditing of information system  
2. Critically analyse and evaluate the need of Information system audit for the business continuity  
3. Understand the security, ethical and regulatory issues pertaining to use of information technology in auditing.  
4. Apply the understanding of the usage of latest developed information system in auditing as a lifelong practice.  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
6. Understand information technology regulatory issues |
| 64. 18MBAPS402 B | Knowledge Management | 1. Understand the concepts of Knowledge Management  
2. Understand and apply the tools used for capturing tacit knowledge and learning from the captured knowledge lifelong.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
4. Understand Business strategies related to Knowledge Management  
5. Gain knowledge in Transformation of an enterprise through Knowledge Management  
6. Do Knowledge Creation and Codification |
| 65. 18MBAPS402 C | Digital and Social Media Marketing | 1. To Understand the Concept of Digital marketing using social media.  
2. To learn tools and utilize the tools of digital marketing and social media.  
3. To understand the linkage of digital marketing, social media and analytics  
4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
5. Gain knowledge in Website designing with WordPress  
6. Understand Social media Marketing Tools |
| 66.  | 18MBAPS402   | System Analysis and Design | 1. Understand the principles, methods and techniques of systems development  
2. Comprehend on the problems relating to systems development.  
3. Understand and apply the various stages of a phased systems analysis method  
4. Apply the tools for designing and analyzing the software required.  
5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
6. Understand System Implementation |
| 67.  | 18MBAPE402   | Innovation Management  
A | 1. Understand the concept of innovation and creativity and apply the learning lifelong.  
2. Comprehend and apply the techniques for generating ideas creatively and applying the same.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work  
4. Gain knowledge on business concepts and innovation of new products  
5. Understand Brainstorming, Lateral thinking and Synectics  
6. Gain knowledge Designing Creative Society and Organization-Creativity Training |
| 68.  | 18MBAPE402   | Family Business Management  
B | 1. Understand the concept family business, managing family business and formulation of succession planning.  
2. Comprehend on the importance of family culture and its uniqueness in fostering generation entrepreneurship.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work  
4. Gain knowledge in Measuring performance of family firms  
5. Understand Strategic Planning and the family business  
6. Gain knowledge in intergenerational growth in entrepreneurial families |
| 69.  | 18MBAPE402   | Entrepreneurial leadership  
C | 1. Understand the concept of entrepreneurial leadership, types and qualities of leaders steering entrepreneurship.  
2. Comprehend on the different leadership styles fostering the performance of team and managing the organization.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work  
5. Understand Various forms of management creativity  
6. Gain knowledge in Developing Leaders and Planning Succession, Leadership Issue for Future Entrepreneurs |
| 70. | 18MBAPE402 D | Rural Entrepreneurship | 1. Understand the concept of rural entrepreneurship, factors influencing the rural entrepreneurship and the strategies to select and formulate a business plan for rural entrepreneurs.  
2. Understand and apply the ecosystem to support the entrepreneurship venture in rural area.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, critical thinking, analysing, planning and team work  
5. Understand Various forms of management creativity  
6. Gain knowledge in Developing Leaders and Planning Succession, Leadership Issue for Future Entrepreneurs |
| 71. | 18MBAPB402 A | Indian Models of Economy, Business and Management | 1. Understand the concept of Indian economy and Indian Models of economy  
2. Select the appropriate business model suitable for the economic condition.  
3. Comprehend on the sustainability innovation, Patent, IPR and its impact in Entrepreneurship  
4. Exhibit group leadership, oral and written communication, critical thinking, analysing, planning and team work.  
5. Gain knowledge in Sustainability Innovation and Entrepreneurship  
6. Understand Experimentation in Innovation Management, Idea Championship, Participation for Innovation and Co-creation for Innovation |
| 72. | 18MBAPB402 B | Institutional support to Small Business | 1. Comprehend the basic understanding of the Institutional support system available to small business and their functioning.  
2. Apply the understanding of the institutional support available to small business in lifelong practice.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
4. Understand Institutional support schemes  
5. Gain knowledge in Marketing Assistance, Research Development and Training Facilities and Export Assistance to MSMEs  
6. Understand Role of RBI, RBI Guidelines to commercial banks, lending by Commercial and Development Banks |
| 73. | 18MBAPB402 C | Policy Framework for Small Business | 1. Understand the different policies applicable to small business and their implications on small businesses.  
2. Comprehend on policy pertaining to credit, technology, tax benefits and Special Economic Zone. (SEZs) for small business and apply the learning lifelong.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work |
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<td>4.</td>
<td>Apprehend different level of Institutional Support Schemes to run the business</td>
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<td>5.</td>
<td>Maintain ethical standards in individual and business life</td>
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<td>6.</td>
<td>Demonstrate knowledge on the ways of Development bank and regulators support for small business</td>
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<tr>
<th>74.</th>
<th>18MBAPB402D</th>
<th>Contemporary Environment in Small Business</th>
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<tbody>
<tr>
<td>1.</td>
<td>Understand the changing scenario in the Liberalization, Privatisation&amp; Globalization (LPG) era, environment and policies fostering small business, rural entrepreneurship, women entrepreneurship and international entrepreneurship.</td>
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<td>2.</td>
<td>Apply the understanding of the changing scenario in the LPG era, environment and policies fostering small business, rural entrepreneurship, women entrepreneurship and international entrepreneurship as lifelong practice.</td>
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<td>3.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<td>4.</td>
<td>Understand Micro, Small and Medium Enterprises Development Act (SMEDA)</td>
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<td>5.</td>
<td>Gain knowledge in Changing scenario of SMEs in the era of Liberalization, Privatisation &amp; Globalization (LPG)</td>
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<td>6.</td>
<td>Demonstrate knowledge on the ways of Development bank and regulators support for small business</td>
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<th>75.</th>
<th>18MBAPA402A</th>
<th>Human Resource Metrics and Analytics</th>
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<tr>
<td>1.</td>
<td>Possess the conceptual understanding of the HR metrics and analytics</td>
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<td>2.</td>
<td>Understand the importance of HR metrics and analytics in measuring HR’s impact and drive business results.</td>
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<td>3.</td>
<td>Identify the right HR metrics (what to measure, types of measurements etc.,) – aligning HR and business goals.</td>
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<td>4.</td>
<td>Utilize metrics into analytics for effective management decisions and align to Strategic decision making.</td>
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<td>5.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<tr>
<td>6.</td>
<td>Understand which metrics you will need and Implement</td>
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<th>76.</th>
<th>18MBAPA402B</th>
<th>Marketing Analytics</th>
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<td>1.</td>
<td>Possess the conceptual understanding of the marketing metrics and analytics</td>
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<tr>
<td>2.</td>
<td>Understand the importance of marketing metrics and analytics in measuring marketing’s impact and drive business results.</td>
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<tr>
<td>3.</td>
<td>Identify the right marketing metrics (what to measure, types of measurements etc.,) – aligning HR and business goals.</td>
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<td>4.</td>
<td>Utilize metrics into analytics for effective management decisions and align to Strategic decision making.</td>
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<td>5.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<tr>
<td>6.</td>
<td>Understand Non-financial measures, Brand Awareness, Test-drive, Churn, CSAT and Customer Satisfaction</td>
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| 77. | 18MBAPA40 2C | Big Data Analytics | 1. Possess the conceptual understanding of big volume of data and its utilization in decision making.  
2. Comprehend on the industry usage of big data in different functions across sectors.  
3. Understand and apply the appropriate tools and techniques for analyzing the big data.  
4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
5. Understand Big Data and the New School of Marketing  
6. Gain knowledge in Probability distribution and Data Modeling |
| 78. | 18MBAPA40 2D | Financial Analytics | 1. Possess the conceptual understanding of the financial metrics and analytics  
2. Select appropriate tools and techniques for analyzing the finance data and apply the same.  
3. Analyze financial data and make decisions to maximise return and minimize risk.  
4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
5. Understand Association and Classification for finance data  
6. Gain knowledge in CAPM model and Beta calculation |
| 79. | 18MBAPI402 A | International Finance | 1. Understand the exchange rate movements, hedging using currency derivatives, and analyse the impact on international trade and investments  
2. Comprehend on the basics of international financial markets, international financial options and foreign direct investments and its application in lifelong practice.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
4. Develop knowledge on international financial institutions  
5. Acquire knowledge on foreign trade.  
6. Understand Financing of foreign trade and Documentation |
| 80. | 18MBAPI402 B | International Marketing Management | 1. Understand the concept of International marketing environment and the international market entry modes and apply lifelong.  
2. Comprehend the 4Ps of marketing in international perspective.  
3. Formulate marketing strategies appropriate for international marketing of products and services.  
4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
5. Understand about the various disciplines contribution in understanding buyer behaviour in a holistic manner familiar with the advances in International marketing |
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<th>Objectives</th>
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| 81. | 18MBAPI402 C | International Human Resource Management          | 1. Understand the concept of International Human resource management, staffing, training and industrial relation pertaining to international work force management and apply the learning lifelong.  
2. Formulate recruitment, training policies pertaining to international human resource management.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
4. Recognize the dynamic relationship between strategy, people, technology, and the processes that drive organizations.  
5. Gain knowledge in Emerging Trends and Perspectives in HRM Cross Cultural Dimensions  
6. Integrate the knowledge of International HRM concepts to take correct business decisions |
| 82. | 18MBAPI402 D | Cross cultural Management                        | 1. Understand the concept of cross-cultural management and impact of cross-cultural issues on business strategy, business functioning and apply the learning lifelong.  
2. Apply the cross-cultural concept in managing workforce, managing teams and performing leadership role in organization.  
3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
4. Recognize Cultural impact on corporate strategy  
5. Gain knowledge in Emerging Trends and Perspectives in Cross Cultural Dimensions  
6. Integrate the knowledge of Big Data and A.I. on multi-cultural organisations |
| 83. | 18MBAPO40 2A | Sourcing Management                              | 1. Understand the concept of sourcing and its importance as strategic organizational function.  
2. Apply the tools and techniques to select the best vendor to deliver quality goods on time and apply the learning lifelong.  
3. Understand the sourcing in the global perspective.  
4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work  
5. Understand the importance of Managing price fluctuation and volatility in international finance  
| 84. | 18MBAPO40 2B | Pricing and Revenue Management                   | 1. Understand the concept of pricing and revenue management.  
2. Apply the economy, network and capacity control on revenue management and apply the learning lifelong.  
3. Understand the different type of pricing and choosing appropriate pricing method |
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<td>4.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<td>5.</td>
<td>Understand the importance of Pre-commitment and Demand Uncertainty and Peak-load pricing under perfect competition</td>
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<tr>
<td>6.</td>
<td>Gain knowledge in Natural Gas Storage and Transmission in Revenue Management in Practice</td>
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<tr>
<td>85.</td>
<td>18MBAPO40 2C</td>
<td>Supply Chain Analytics</td>
</tr>
<tr>
<td>1.</td>
<td>Equip with an understanding of the “importance and role of supply chain analytics” in the modern business enterprises</td>
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<tr>
<td>2.</td>
<td>Comprehend on how business firms can take advantage with the help of supply chain analytics.</td>
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<tr>
<td>3.</td>
<td>Apply supply chain analytics with analytical platforms.</td>
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<td>4.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<tr>
<td>5.</td>
<td>Understand the different ways of payment and payment services available.</td>
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<tr>
<td>6.</td>
<td>Gain knowledge in supply chain analytics management</td>
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<td>86.</td>
<td>18MBAPO40 2D</td>
<td>Services operations management</td>
</tr>
<tr>
<td>1.</td>
<td>Understand the concept of operations management in services sector.</td>
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<td>2.</td>
<td>Comprehend on understanding of services design, service quality, and service facility.</td>
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<td>3.</td>
<td>Apply capacity and demand assessment tools in service operations.</td>
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<td>4.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<td>5.</td>
<td>Understand process flow diagram, process steps and simulation</td>
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<td>6.</td>
<td>Gain knowledge in supply management tactics, operations planning and control</td>
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<tr>
<td>87.</td>
<td>18MBAPT402 A</td>
<td>Travel Agency and Tour Operations</td>
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<tr>
<td>1.</td>
<td>Understand the current trends and practices in the tourism and travel trade sector</td>
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<td>2.</td>
<td>Be aware of travel agency, tour operation business and functions of travel agency</td>
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<td>3.</td>
<td>Know the tour packaging &amp; pricing</td>
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<td>4.</td>
<td>Assess the role and responsibility of travel trade associations</td>
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<td>5.</td>
<td>Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</td>
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<td>6.</td>
<td>Understand Classifications of Tour Packages</td>
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<td>88.</td>
<td>18MBAPT402 B</td>
<td>Ecotourism</td>
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<tr>
<td>1.</td>
<td>Comprehend the theories and practices of ecotourism;</td>
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<td>2.</td>
<td>Familiar with the model of ecotourism projects; and significance of ecotourism;</td>
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<td>3.</td>
<td>Identify issues and challenges of conservation of ecotourism</td>
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<td>4.</td>
<td>Understand the role of the regulatory bodies and society to preserve ecotourism</td>
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<td>NO.</td>
<td>Code</td>
<td>Programme</td>
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<td>89.</td>
<td>18MBAPT402</td>
<td>Event Management</td>
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<td>90.</td>
<td>18MBAPT402</td>
<td>Healthcare Tourism</td>
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<tr>
<td>91.</td>
<td>18MBAP411</td>
<td>Communication Practice</td>
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</table>
Course: B.Sc. Maths

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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<tbody>
<tr>
<td>1.</td>
<td>19LSU101</td>
<td>Language-I</td>
<td>1. Understand the concepts of hyperbolic functions.</td>
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<td>2. Explore the concept of reduction formula and calculate limits in indeterminate forms by a repeated use of L'Hospital rule.</td>
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<td>3. Use single and multiple integration to calculate the arc length, area and volume.</td>
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<td>4. Understand the techniques of sketching conics and properties of conics.</td>
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<td>5. Know about the knowledge on application of vector functions.</td>
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<td>6. Acquire the knowledge on application of Kepler’s second law.</td>
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<td>2.</td>
<td>19ENU101</td>
<td>English</td>
<td>1. Develop the knowledge of interpersonal skills.</td>
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<td>2. Establish and maintain social relationships.</td>
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<td>3. Genres of literature will give moral values of life.</td>
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<td>4. Develop communication skills in business environment</td>
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<td>5. Communication skills will get developed.</td>
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<td>6. Develop to have language competence.</td>
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<td>3.</td>
<td>19MMU101</td>
<td>Calculus</td>
<td>On successful completion of this course, the students will be able to</td>
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<td>6. Acquire the knowledge on application of Kepler’s second law.</td>
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<td>4.</td>
<td>19MMU102</td>
<td>Algebra</td>
<td>On successful completion of this course, the students will be able to</td>
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<td></td>
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<td>1. Know about the basic concepts of set theory.</td>
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<td>2. Describe the categories of functions.</td>
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<td>3. Understand the algorithms on operation.</td>
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<td>4. Use matrix operations to solve system of linear equations.</td>
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<td>5. Learn how to find characteristic equation, eigen value and eigen vector for matrix.</td>
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<td>Course Code</td>
<td>Course Name</td>
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<td>5.</td>
<td>19MMU103</td>
<td>Physics I</td>
<td>1. Demonstrate proficiency in mathematics and the mathematical concepts to understand physics.</td>
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<td>2. Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.</td>
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<td>3. Demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.</td>
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<td>4. Know about the Laws of thermodynamics.</td>
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<td>5. Know about the Intrinsic and extrinsic semiconductor.</td>
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<td>6. Understand the graphical relationship of resistance, capacitor and inductor.</td>
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<td>6.</td>
<td>19MMU111</td>
<td>Calculus - Practical</td>
<td>1. Familiarize with the programming environment.</td>
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<td>2. Acquire the problem solving skills through computer programming.</td>
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<td>3. Understand to write diversified solutions using programming language.</td>
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<td>4. Plot of graphs of functions (exponential, logarithmic, trigonometric).</td>
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<td>5. Sketching parametric curves (E.g. Trochoid, cycloid, epicycloids, hypocycloid).</td>
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<td>6. Deal with different input/output methods.</td>
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<td>7.</td>
<td>19MMU112</td>
<td>Physics I-Practical</td>
<td>1. Perform basic experiments in mechanics and electricity and analyze the data.</td>
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<td>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</td>
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<td>3. Know the physical Principles and applications of Electronics.</td>
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<td>4. Apply the analytical techniques and graphical analysis to the experimental data.</td>
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<td>5. Apply the various procedures and techniques for the experiments.</td>
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<td>6. Use the different measuring devices and meters to record the data with precision.</td>
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<td>8.</td>
<td>19LSU201</td>
<td>Language - II</td>
<td>1. மேலும் உருவாக்குவதற்கு மூலம் பல கருவியைப் பயரக்கை விளக்குவதற்கு எடுத்துவாங்கியுள்ளன, மேலும் பார்வை கீழ்நிலைக்குரிய, ‘புதிய உருவாக்கு வேலை’ என்கிற படித்தலைக்கு அன்புபெற்று பிள்ளைகளுக்கு என்று ஐரோப்பிய கலைநாட்டின் படித்தலைக்கு முன்னேறிய படித்தலைக்கு என்று ஐரோப்பிய கலைநாட்டின் விளக்குவதற்கு எடுத்துவாங்கியுள்ளன.</td>
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<td>2. கருவியைக்குரிய, பல கருவியைப் பயன்பாட்டில் பயன்படுத்தும் கருவியைக்குரிய கருவியைக்குரிய படித்தலைக்கு முன்னேறிய படித்தலைக்கு என்று ஐரோப்பிய கலைநாட்டின் விளக்குவதற்கு எடுத்துவாங்கியுள்ளன.</td>
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<td>Course Code</td>
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<td>On successful completion of this course, the student will be able to</td>
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| 9. 19MMU201 | Differential Equations                    | 1. Understand the concepts of explicit, implicit and singular solutions of a differential equation.  
                               2. Acquire knowledge on linear and bernoulli’s equations.  
                               3. Know the concepts of population model.  
                               4. Understand the method of solving differential equation using variation of parameters. Identify the applications of differential equations.  
                               5. Know about the concepts of Laplace Transform.  
                               6. Understand the concept of inverse Laplace transform. |
| 10. 19MMU202| Real Analysis                             | 1. Understand about the categories of sets.  
                               2. Acquire the knowledge on limits and convergence of sequences.  
                               3. Know the types of test of convergence for series.  
                               4. Familiarize about the basic theorems on monotone sequences.  
                               5. Know about the radius of convergence.  
                               6. Understand the Power series and radius of convergence. |
| 11. 19MMU203| Physics II                                | 1. Explain how physics applies to phenomena in the world around them.  
                               2. Recognize how and when physics methods and principles can help address problems in their major and then apply those methods and principles to solve problems.  
                               3. Study the theory of Photoelectric effect.  
                               4. List different types of atomic spectra.  
                               5. Understand the importance of Mosley’s law and Bragg’s law.  
                               6. Understand the concept of digital electronics. |
| 12. 19MMU211| Differential Equations - Practical        | 1. Demonstrate comprehension in fundamental topics of computing, algorithms, computer organization and software systems.  
                               2. Have applied knowledge of areas of computing to create solutions to challenging problems, including specify, design, implement and validate solutions for new problems.  
                               3. Be aware of current research activity in computing through activities including reading papers, hearing research presentations. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>On successful completion of the course, the student will be able to</th>
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</table>
| 13. 19MMU212 | Physics II- Practical             | 4. Know about successfully planning and completing an individual research project in computing or its application.  
5. Understand Cauchy’s root test and Ratio test by plotting the ratio.  
6. Acquire the knowledge on Growth model and Decay model |
| 14. 19AEC201 | Environmental Studies             | 1. Perform basic experiments in mechanics, heat and electricity and analyze the data.  
2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.  
3. Know the physical Principles and applications of Electronics.  
4. Apply the various procedures and techniques for the experiments.  
5. Apply the mathematical concepts/equations to obtain quantitative results.  
6. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results. |
| 15. 18MMU301 | PDE and Systems of ODE            | 1. Understand the basic concepts partial differential equations.  
3. Know about the Reduction of second order Linear Equations to canonical forms.  
4. Study the Method of separation of variables and Solving the Vibrating String.  
5. Understand the Basic Theory of linear systems in normal form.  
6. Use the Numerical methods to solve the real world problems. |
| 16. 18MMU302 | Group Theory I                    | 1. Expertise on fundamental of groups.  
2. Know about Subgroups and its properties. |
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<td>3.</td>
<td>Understand the concept of cyclic groups and its properties.</td>
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<td>4.</td>
<td>Acquire the knowledge on basic concepts of Permutation group.</td>
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<td>5.</td>
<td>Apply Cauchy’s theorem for finite abelian groups.</td>
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<td>6.</td>
<td>Understand the concepts of Isomorphism.</td>
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<td>17.</td>
<td>18MMU303</td>
<td>Analytical Geometry</td>
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<td>18MMU303</td>
<td>Computer Graphics</td>
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<td>20.</td>
<td>18MMU311</td>
<td>PDE and Systems of ODE - Practical</td>
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<tr>
<td>3.</td>
<td>Determine solutions to second order linear homogeneous, non-homogeneous differential equations with constant coefficients.</td>
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<td>4.</td>
<td>Solve the Canonical Forms of First-order Linear Equations.</td>
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<td>5.</td>
<td>Understand the Equations with non-homogeneous boundary conditions.</td>
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<td>21.</td>
<td>18MMU312</td>
<td>Physics-I-Practical</td>
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<td>On successful completion of this course, the students will be able to:</td>
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<td>22.</td>
<td>18MMU401</td>
<td>Numerical Methods</td>
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<td>On successful completion of the course, students will be able to:</td>
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<td></td>
<td>1. Study the concept of Newton’s Method.</td>
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<td>2. Realize the system of linear algebraic equations along with specified methods.</td>
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<td>3. Know about the basic concepts of Interpolation.</td>
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<td>4. Understand the Gregory forward and backward difference interpolation.</td>
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<td>5. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.</td>
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<td>23.</td>
<td>18MMU402</td>
<td>Group Theory II</td>
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<td>On successful completion of the course, students will be able to:</td>
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<td>1. Expertise on fundamental theorems of cosets and Lagrange’s.</td>
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<td>2. Know about external direct products and its developments.</td>
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<td>3. Understand the concept of normal subgroups and factor groups.</td>
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<td>4. Acquire the knowledge on basic concepts of group homomorphism.</td>
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<td>5. Study about fundamental theorems of Abelian groups.</td>
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<td>6. Understand the Isomorphism Classes of Abelian Groups</td>
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<td>24.</td>
<td>18MMU403A</td>
<td>Graph Theory</td>
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<td>On successful completion of the course, students will be able to:</td>
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<tr>
<td></td>
<td>1. Understand and Apply the fundamental concepts in graph theory.</td>
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<td>2. Understand basic results related with Eulerian and Hamiltonian graphs.</td>
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</table>
4. Know about the fundamental concepts of trees.  
5. Understand the Spanning trees, rank and nullity.  
6. Mastery in Dijkstra’s algorithm-Floyd-Warshall algorithm |
|----------------------------------------|-------------------------------------------------|
| 26. 18MMU404 Physics-II                | On successful completion of this course, the student will be able to 
1. Familiar with the memory allocation methods, page replacement algorithms, file allocation methods, multi-threading, process synchronization, and CPU scheduling.  
2. Describe the main components of OS and their working.  
3. Explain the concepts of process and thread and their scheduling policies.  
4. Solve synchronization and deadlock issues.  
5. Compare the different techniques for managing memory, I/O, disk and files.  
6. Design components of operating system. |
| 27. 18MMU411 Numerical Methods - Practical | On successful completion of this course, the student will be able to 
1. Explain how physics applies to phenomena in the world around them.  
2. Recognize how and when physics methods and principles can help address problems in their major and then apply those methods and principles to solve problems.  
3. Study the theory of Photoelectric effect.  
4. List different types of atomic spectra.  
5. Understand the importance of Mosley’s law and Bragg’s law.  
6. Understand the concept of digital electronics. |
| 28. 18MMU412 Physics-II-Practical       | On successful completion of this course, the student will be able to 
1. Perform basic experiments in mechanics, heat and electricity and analyze the data.  
2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.  
3. Know the physical Principles and applications of Electronics.  
4. Apply the various procedures and techniques for the experiments. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>On successful completion of this course, the student will be able to:</th>
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</table>
| 29. 17MMU501 A | Ring Theory and Linear Algebra I | 1. Understand the concept of rings, subrings, vector spaces, subspaces, algebra of subspaces, isomorphism and its properties.  
2. Understand the concept of ring homomorphisms, properties of ring homomorphisms.  
3. Know about the Vector spaces and dimension.  
4. Analyze Linear transformations and matrix representation of a linear transformation.  
5. Study change of coordinate matrix and its properties.  
6. Understand Isomorphism theorems I, II and III, field of quotients. |
| 30. 17MMU501 B | Portfolio Optimization | On successful completion of this course, the student will be able to  
1. Understand the various alternatives available for investment.  
2. Learn to measure risk and return.  
3. Find the relationship between risk and return.  
4. Value the equities and bonds.  
5. Gain knowledge of the various strategies followed by investment practitioners.  
6. Study Index tracking optimization models. |
| 31. 17MMU502 A | Probability and Statistics | On successful completion of this course, the student will be able to  
1. Understand the basic concepts of Measures of central tendency.  
2. Know about the Probability Concepts and its properties.  
4. Study the Continuous distributions and its types.  
5. Understand the Basic Theory of Chebyshev’s inequality.  
| 32. 17MMU502 B | Boolean Algebra and Automata Theory | On successful completion of this course, the student will be able to  
1. Understand how lattices and Boolean algebra are used as tools and mathematical models in the study of networks.  
2. Define various categories of automata.  
3. Context free grammars and pushdown automata.  
4. Understand Turing machine as a model of computation.  
5. Define the various categories of Undecidability.  
6. Knowledge about Post Correspondence Problem. |
| 33. 17MMU503 A | Multivariate Calculus | On successful completion of this course, the student will be able to  
1. Understand the functions of several variables.  
2. Know about the Extrema of functions of two variables.  
3. Use double, triple and its applications. |
| 34. | 17MMU503 B | Differential Geometry | On successful completion of this course, the student will be able to
1. Understand the theory of space curves with examples.
2. Study the concept of parametric curves on surfaces.
3. Know about the torsion of a geodesic and geodesic curvature.
4. Study the Tensors of different type, Algebra of tensors and contraction.
5. Know about the Parallel propagation of vectors.
6. Understand Laplacian operators in tensor form. |

| 35. | 17MMU504 | Physics-I | On successful completion of this course, the students will be able to
1. Demonstrate proficiency in mathematics and the mathematical concepts to understand physics.
2. Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.
3. Demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.
4. Know about the Laws of thermodynamics.
5. Know about the Intrinsic and extrinsic semiconductor.
6. Understand the graphical relationship of resistance, capacitor and inductor. |

| 36. | 17MMU511 | Physics-I-Practical | On successful completion of this course, the students will be able to
1. Perform basic experiments in mechanics and electricity and analyze the data.
2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.
3. Know the physical Principles and applications of Electronics.
4. Apply the analytical techniques and graphical analysis to the experimental data.
5. Apply the various procedures and techniques for the experiments.
6. Use the different measuring devices and meters to record the data with precision. |

| 37. | 17MMU601 A | Ring Theory and Linear Algebra II | On successful completion of this course, the student will be able to
1. Polynomial rings over commutative rings, dual spaces, dual basis, double dual, minimal solutions to systems of linear equations, normal and self-adjoint operators.
2. Understand the Divisibility in integral domains.
3. Study the transpose of a linear transformation and its matrix in the dual basis.
4. Know about the Inner product spaces and norms.
5. Study Least Squares Approximation, minimal solutions to systems of linear equations. |
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<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>On successful completion of this course, the student will be able to</th>
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</table>
| 38. | 17MMU601 B  | Mechanics                    | 1. Understand the concept of the Moment of a force about a point and an axis.  
                              | 2. Classify the Laws of Coulomb friction.                              
                              | 3. Solve the problems of Conservative force field and conservation for mechanical energy.  
                              | 4. Solve the Problems of equilibrium under forces including friction.  
                              | 5. Analyze the Velocity and acceleration of a particle along a curve.  
                              | 6. Know about the basic concepts of Simple harmonic motion, Simple Pendulum, Projectile Motion. |
| 39. | 17MMU602 A  | Metric Spaces and Complex Analysis | 1. Understand the various properties of metric spaces  
                              | 2. Definite continuous mappings - sequential criterion.                
                              | 3. Understand the basic concepts of Riemann equations, sufficient conditions for differentiability.  
                              | 4. Explore various properties of Analytic functions.                 
                              | 5. Understand the Contour integrals and its examples.                
                              | 6. Apply the concept Liouville’s theorem and the fundamental theorem of algebra. |
| 40. | 17MMU602 B  | Industrial Mathematics       | 1. Get adequate exposure to global and local concerns so as to explore many aspects of Mathematical Sciences.  
                              | 2. Apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.  
                              | 4. Aware of history of mathematics and hence of its past, present and future role as part of our culture.  
                              | 5. Know the concept of Radon Transform.                             
                              | 6. Use the application of Fourier and inverse Fourier transforms.    |
| 41. | 17MMU603    | Physics – II                 | 1. Explain how physics applies to phenomena in the world around them.  
                              | 2. Recognize how and when physics methods and principles can help address problems in their major and then apply those methods and principles to solve problems.  
                              | 3. Study the theory of Photoelectric effect.                        
                              | 4. List different types of atomic spectra.                          
                              | 5. Understand the importance of Mosley’s law and Bragg’s law.       
                              | 6. Understand the concept of digital electronics.                  |
|   |   |   | On successful completion of this course, the student will be able to  
1. Perform basic experiments in mechanics, heat and electricity and analyze the data.  
2. Acquire engineering skills and practical knowledge, which help the student in their everyday life.  
3. Know the physical Principles and applications of Electronics.  
4. Apply the various procedures and techniques for the experiments.  
5. Apply the mathematical concepts/equations to obtain quantitative results.  
6. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results. |
Name of the Department: **Mathematics**

**Course:** M.Sc. Maths

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.     | 19MMP101    | Algebra            | After successful completion of this course the students will be able to  
1. Understand the concept and the properties of finite abelian groups.  
2. Get pre-doctoral level knowledge in ring theory.  
3. Attain good knowledge in field theory.  
4. Define and study in details the properties of linear transformations.  
5. Analyze the concept of trace and transpose.  
6. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts quadratic forms. |
| 2.     | 19MMP102    | Real Analysis      | On successful completion of this course, students will be able to  
1. Get specific skill in Riemann Stieltjes integral and Lebesgue integral.  
2. Attain knowledge in infinite series.  
3. Demonstrate an understanding of the uniform convergence and differentiation.  
4. Enrich their knowledge of measure theory and extremum problems.  
5. Solve given problems at a high level of abstraction based on Implicit function.  
6. Describe the fundamental properties of the real numbers that underpin the formal development of real analysis. |
| 3.     | 19MMP103    | Numerical Analysis | On successful completion of this course, students will be able to  
1. Identify the concept of numerical differentiation and integration.  
2. Provide information on methods of iteration.  
3. Solve ordinary differential equations by using Euler and modified Euler method.  
4. Study in detail the concept of boundary value problems.  
5. Attain mastery in the numerical solution of partial differential equations.  
6. Apply numerical methods to obtain approximate solutions to mathematical problems. |
| 4.     | 19MMP104    | Ordinary Differential Equations | On successful completion of this course, students will be able to  
1. Model a simple physical system to obtain a first and second order differential equation.  
2. Understand the basic notions of linearity, superposition, existence and uniqueness of solution to differential equations and use these concepts in solving linear differential equations.  
3. Identify homogeneous equations, homogeneous equations with constant coefficients and exact linear differential equations. |
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<tr>
<td>5.</td>
<td>19MMP105A</td>
<td>Advanced Discrete Mathematics</td>
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<td>On successful completion of this course, students will be able to</td>
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<td>1. Develop new algebraic structures.</td>
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<td>2. Think critically and analytically by modelling problems form social and natural sciences with the help of theory of graphs.</td>
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<td>3. Apply discrete mathematics in formal representation of various computing constructs</td>
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<td>4. Work effectively in groups on a project that requires an understanding of graph theory.</td>
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<td>5. Demonstrate different traversal methods for trees and graphs.</td>
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<td>6. Recognize the importance of analytical problem-solving approach.</td>
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|6. | 19MMP105B | Number Theory |
|   |   | On successful completion of this course, students will be able to |
|   |   | 1. Identify and apply various properties of and relating to the integers including the Well-Ordering Principle, primes, unique factorization, the division algorithm, and greatest common divisors. |
|   |   | 2. Identify how number theory is related to and used in cryptography. |
|   |   | 3. Identify certain number theoretic functions and their properties. |
|   |   | 4. Understand the concept of a congruence and use various results related to congruences including the Chinese Remainder Theorem. |
|   |   | 5. Solve certain types of Diophantine equations. |
|   |   | 6. Acquire a broad knowledge in Greatest Integer Function. |

|7. | 19MMP105C | Combinatorics |
|   |   | On successful completion of this course, students will be able to |
|   |   | 1. Cognition in various combinatorial methods. |
|   |   | 2. Solve recurrence relations through computational skills. |
|   |   | 3. Apply the inclusion/exclusion principle. |
|   |   | 4. Develop fundamental knowledge of combinatorics and Euler function. |
|   |   | 5. Analyze combinatorial objects satisfying certain properties and answer questions related to Necklace problem. |
|   |   | 6. Know the concept of Burnside’s lemma. |

<p>|8. | 19MMP106 | Mechanics |
|   |   | On successful completion of this course students will be able to |
|   |   | 1. Understand the concept of the D’Alembert’s principle. |
|   |   | 2. Derive the Lagrange’s equation for holonomic and non holonomic constraints. |
|   |   | 3. Classify Scleronomic and Rheonomic systems. |</p>
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<tr>
<td>5.</td>
<td>Study of the canonical transformations.</td>
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<tr>
<th>9.</th>
<th>19MMP111</th>
<th>Numerical Analysis - Practical</th>
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<tbody>
<tr>
<td>On successful completion of this course, the student will be able to:</td>
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<tr>
<td>1. Know the concepts for problem solving.</td>
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<tr>
<td>2. Acquire new knowledge in computing, including the ability to learn about new ideas and advances, techniques, tools, and languages, and to use them effectively; and to be motivated to engage in life-long learning</td>
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<tr>
<td>3. Comprehend important issues related to the development of computer-based systems in a professional context using a well-defined process.</td>
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<td>4. Be familiar with programming with numerical packages.</td>
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<td>5. Be aware of the use of numerical methods in modern scientific computing.</td>
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<tr>
<td>6. To develop the mathematical skills of the students in the areas of numerical methods.</td>
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<tr>
<th>10.</th>
<th>19MMP201</th>
<th>Linear Algebra</th>
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<tbody>
<tr>
<td>On successful completion of this course, students will be able to:</td>
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<tr>
<td>1. Recognize some advances of vector spaces and linear transformations.</td>
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<tr>
<td>2. Understand the concepts of linear algebra in geometric point of view.</td>
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<td>3. Visualize linear transformations as a matrix form.</td>
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<td>4. Decompose a given vector space in to certain canonical forms.</td>
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<tr>
<td>5. Know the concept of canonical transformation.</td>
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<tr>
<td>6. Understand the concept of Quadratic forms</td>
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<tr>
<th>11.</th>
<th>19MMP202</th>
<th>Complex Analysis</th>
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<tbody>
<tr>
<td>On successful completion of this course, students will be able to:</td>
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<tr>
<td>1. Explain the role of the Conformal mapping.</td>
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<tr>
<td>2. Evaluate complex contour integrals and some of their consequences.</td>
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<td>3. Determine the Taylor series or the Laurent series of an analytic function in a given region</td>
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<td>4. Describe the convergence properties of a power series.</td>
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<td>5. Know the basic properties of singularities of analytic functions.</td>
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<td>6. Demonstrate familiarity with a range of examples of these concepts of conformal mapping.</td>
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<tr>
<th>12.</th>
<th>19MMP203</th>
<th>Optimization Techniques</th>
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<tbody>
<tr>
<td>After successful completion of this course the students will be able to:</td>
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<tr>
<td>1. Understand the concept of linear programming and integer programming.</td>
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<td>2. Develop optimal decision policy skill.</td>
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<td>3. Familiarize with real life applications of inventory models.</td>
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<tr>
<td>4. Skill in decision analysis.</td>
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<td>5. Mastery in Beale's method and simplex method.</td>
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<tr>
<td>6. Use classical optimization techniques and numerical methods of optimization.</td>
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</tbody>
</table>
| 13. | 19MMP204 | Partial Differential Equations | After successful completion of this course the students will be able to  
1. Classify linear and Nonlinear first order differential equations with constant coefficients.  
2. Solve the linear partial differential equations with constant coefficient equations.  
3. Describe the method of separable variables and integral transforms.  
4. Solve the elementary Laplace equation with symmetry.  
5. Acquire the knowledge of wave equation and vibrating membranes.  
6. Enrich their knowledge about diffusion equations with sources. |
| 14. | 19MMP205A | Graph Theory | On successful completion of this course, students will be able to  
1. Applied the knowledge of graphs to solve the real-life problem.  
2. Overview of properties of trees and a minimal spanning tree for a given weighted graph.  
3. Understanding the basic concepts of graphs, directed graphs, and weighted graphs and able to present a graph by matrices.  
4. Understand Eulerian and Hamiltonian graphs.  
5. Determine whether graphs are Planer and/or non planer.  
6. Identify induced subgraphs, cliques, matchings, covers in graphs. |
| 15. | 19MMP205B | Differential Geometry | On successful completion of this course the students will be able to  
1. Obtain in depth knowledge of problems and properties of curves and surfaces based on vector methods in geometrical view point  
2. Understand fundamental existence theorem for space curves  
3. Discuss the Involutes and evolutes.  
4. Mastery in canonical geodesic equations  
5. Find geodesic curvature for various surfaces  
6. Determine and calculate curvature of curves in different coordinate systems. |
| 16. | 19MMP205C | Fundamentals of Actuarial Mathematics | On successful completion of this course the student will be able  
1. Explain the basic concepts of accounts and calculations of interest rates in banking / financial institution system.  
2. Describe about Premiums of Life Insurance and Endowment Assurance (Pure, Double and Marriage) and Educational Annuity plan.  
3. Define Annuity and Summarize / calculate different values Annuities.  
4. Find the Annuity values for various Annuities.  
6. Leant about how to read Mortality Table and from that how to calculate the Probability of Survival and Death. |
| 17. | 19MMP206 | Fluid Dynamics | On successful completion of this course, students will be able to  
1. Classify and exploit fluids based on the physical properties of a fluid.  
2. Compute correctly the kinematical properties of a fluid element.  
3. Apply the concept of Bernoulli’s theorem in steady motion.  
4. Understand both flow physics and mathematical properties of governing Navier-Stokes equations and define proper boundary conditions for solution.  
5. Provide the student with the basic mathematical background and tools to model fluid motion.  
6. Develop a physical understanding of the important aspects that govern incompressible flow that can be observed in a variety of situations in everyday life. |
| 18. | 19MMP211 | Optimization Techniques – Practical | On successful completion of this course, the student will be able to  
1. Use the object oriented concepts for implementation of Optimization Techniques.  
2. Implement the data structure concepts for Optimization Techniques problems.  
3. Acquire skills to solve various multivariable optimization problems  
4. Solve of different optimization problems.  
5. Identify and develop operational research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimization problems.  
6. Use mathematical software to solve the proposed models. |
| 19. | 19MMP301 | Functional Analysis | After successful completion of this course the students will be able to  
1. Develop Banach spaces from vector spaces.  
2. Describe the open mapping theorem.  
3. Discuss Hilbert spaces and its properties.  
4. Study in detail about the adjoint of an operator.  
5. Handle complex problems concerning topics within the area of Functional Analysis.  
6. Understand and apply fundamental theorems from the theory of normed and Banach spaces. |
| 20. | 19MMP302 | Number Theory | On successful completion of this course, students will be able to  
1. Identify and apply various properties of and relating to the integers including the Well-Ordering Principle, primes, unique factorization, the division algorithm, and greatest common divisors.  
2. Identify how number theory is related to and used in cryptography.  
3. Identify certain number theoretic functions and their properties.  
4. Understand the concept of a congruence and use various results related to congruences including the Chinese Remainder Theorem.  
5. Solve certain types of Diophantine equations. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>On successful completion of this course the student will be able to</th>
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<tr>
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<td>2. Understand the use of modern technology in solving real-world to Epidemic models.</td>
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<td>3. Problems through ordinary differential equations, probability theory, graphs.</td>
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<td>4. Formulate a mathematical model given a clear statement of the underlying scientific principles.</td>
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<td>5. Solve basic linear difference equations and solve application problems.</td>
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<td>6. Know the concept of mathematical modelling through Graphs.</td>
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<tr>
<td>19MMP304</td>
<td>Mathematical Statistics</td>
<td>1. Explain the concepts of probability, including conditional probability.</td>
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<td>2. Explain the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables.</td>
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<td>3. Summarize the main features of a data set and test statistical hypotheses.</td>
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<td>4. Define basic discrete and continuous distributions, be able to apply them and simulate them in simple cases.</td>
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<td>5. Explain the concepts of analysis of variance and use them to investigate factorial dependence.</td>
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<td>6. Describe the main methods of estimation and the main properties of estimators, and apply them.</td>
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<td>19MMP305A</td>
<td>Formal Languages and Automata Theory</td>
<td>1. Understand the definition of Automata.</td>
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<td>2. Know about the different concepts in automata theory and formal languages such as formal proofs, non-deterministic automata, regular expressions, regular languages context-free grammars, context-free languages.</td>
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<td>3. Discuss the acceptability of a string by finite automation.</td>
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<td>4. Applications of Pumping Lemma.</td>
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<td>5. Design automata, regular expressions and context-free grammars accepting or generating certain languages.</td>
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<td>6. Acquire concepts relating to the theory of computation and computational models including decidability and intractability.</td>
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<tr>
<td>19MMP305B</td>
<td>Magnetohydrodynamics</td>
<td>1. Provide the details of the derivation of ideal and resistive MHD equations.</td>
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<td>2. Demonstrate the basic properties of ideal MHD.</td>
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<td>3. Describe electromagnetic boundary conditions.</td>
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<td>4. Explain MHD waves.</td>
<td>5. Describe the derivation of fluid equations, energy equation. 6. Describe electromagnetic fields in the energy and momentum fluxes.</td>
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<tr>
<td>25.</td>
<td>19MMP305C Fuzzy Topology</td>
<td>On successful completion of this course the student will be able to: 1. Able to learn fuzzy set theory. 2. Understand the concept of Operations on Fuzzy Sets 3. Mastery in fuzzy relations and fuzzy graphs 4. Attain in-depth knowledge in fuzzy relations. 5. Understand the knowledge of Fuzzy Logic. 6. Gain knowledge about the fundamental concepts of $\alpha$-shading families.</td>
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<tr>
<td>26.</td>
<td>19MMP306 Mathematical Methods</td>
<td>On successful completion of this course the students will be able to, 1. Calculate the Fourier transform of elementary functions from the definition. 2. Find the Fourier transforms of functions of one variable. 3. Calculate the Laplace equation in half plane of standard functions both from the definition and by using tables. 4. Equation with separable kernel and Fredholm alternative approximation Method. 5. Select and combine the necessary Laplace transform techniques to solve second-order ordinary differential equations. 6. Understand the concept of Functionals of the integral forms.</td>
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<tr>
<td>27.</td>
<td>18MMP311 Mathematical Statistics–Practical</td>
<td>On successful completion of this course, the student will be able to 1. Describe and classify data using statistical terminology. 2. Use SPSS to conduct basic descriptive analyses and graphical presentations. 3. Define the null hypothesis and the alternative hypothesis and Interpret P values and confidence intervals. 4. Understand different measures of effect (e.g. mean difference). 5. Know when to use basic statistical hypothesis tests (t-tests, chi-squared tests, correlation) and how to carry out these tests using SPSS. 6. Appreciate how to present and interpret these results in scientific reports.</td>
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<tr>
<td>28.</td>
<td>18MMP401 Measure Theory</td>
<td>After successful completion of this course the students will be able to: 1. Get a clear view of the fundamentals of measure theory. 2. Acquaint with the proofs of the fundamental theorems underlying the theory of Lebesgue integration. 3. Identify the broader impact of measure theory in ergodic theory and ability to pursue further studies in this area. 4. Mastery in the measure spaces and its properties.</td>
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<td>5.</td>
<td>Apply the theorems of monotone and dominated convergence and Fatou's lemma.</td>
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<td>6.</td>
<td>Apply Lebesgue decomposition and the Radon-Nikodym theorem.</td>
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</table>
Name of the Department: **Microbiology**

**Course:** B.Sc. Microbiology

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.      | 19ENU101    | English            | 1. Develop the knowledge of interpersonal skills.  
                                                      2. Establish and maintain social relationships.  
                                                      3. Genres of literature will give moral values of life.  
                                                      4. Develop communication skills in business environment  
                                                      5. Communication skills will get developed.  
                                                      6. Develop to have language competence |
| 2.      | 19MBU101    | Introduction To Microbiology And Microbial Diversity | 1. After completion of this course paper, the students clearly understand the contributions of various scientists for development of microbiology field and skills associated with it.  
                                                      2. This course will demonstrate the diversity of microbes and their applications.  
                                                      3. Students will know about the various field of Microbiology  
                                                      4. Students will know the role of microorganism in fermentation and spoilage  
                                                      5. Able to understand the special features of algae, fungi and protozoa  
                                                      6. Familiarize with morphologic criteria to differentiate the most common protozoan |
| 3.      | 19MBU102    | Bacteriology       | 1. Understand the basic microbial structure and function and this course provide an understanding of the concepts of bacteriology which is one of the basic requirements for their employability  
                                                      2. Understand the structural similarities and differences among various physiological groups of bacteria and archaea  
                                                      3. Demonstrate theory and practical skills in staining procedures  
                                                      4. Understand various Culture media and their applications  
                                                      5. Understand various physical and chemical means of sterilization  
                                                      6. Know General bacteriology and microbial techniques for isolation of pure culture of bacteria |
| 4.      | 19MBU103    | Biochemistry -I    | 1. Understand the structures of enzymes, proteins, carbohydrates and fats  
                                                      2. Understand the functions of biomolecules  
                                                      3. Analyze the process of metabolism  
                                                      4. Understand of nucleic acids and their importance to combine and analyses information. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</table>
| 5. 19MBU111 | Basic Microbiology-Practical | 1. This practical paper will build the student to describe and distinguish the bacterial colonies.  
2. They also will create knowledge on preparing permanent temporary mounts for fungi, protozoan’s and algae.  
3. Students will able to understand the parasites and its nature.  
4. They can able to handle the pathogens safely.  
5. Students able to describe the Spirogyra, Chlamydomonas and Volvox  
6. Students able to handle the instruments in the microbiology laboratory |
| 6. 19MBU112 | Bacteriology-Practical | 1. Theory and practical skills in staining procedures  
2. Various Culture media and their applications  
3. Various microbial culture techniques to obtain isolation of pure cultures of bacteria  
4. Bacterial endospore and capsule  
5. Able to analyze the Bacterial size  
6. Able explain the bacterial motility and flagella |
| 7. 19MBU113 | Biochemistry- I - Practical | 1. The practical knowledge and the skills associated about various techniques used in Biochemistry.  
2. The skill in qualitative and quantity analysis of carbohydrates, protein and lipid  
3. An understanding in protein secondary and tertiary structures  
4. An insight in enzyme activity and its physical factors influence the activity  
5. Knowledge on vitamin estimation  
6. Cognitive skill and students able to solve the numerical problems |
| 8. 19LSU201 | विज्ञान बालि - I | 1. वैज्ञानिक व्यव्यवसायिक विधियाँ की सामान्यता  
2. वैज्ञानिक व्यवसायिक विधियाँ की सामान्यता  
3. वैज्ञानिक व्यवसायिक विधियाँ की सामान्यता |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
</table>
| 9. 19MBU201 | Biochemistry - II                | 1. A candidate can able to understand metabolic pathways of carbohydrates, proteins, Lipids and Nucleic acid that improve their skills.  
2. This course will provide clear understanding about the Biological oxidation.  
3. Students able to categorize the biochemical compounds  
4. Students able to demonstrate the carbohydrate, protein and nucleic acid  
5. Students able to comment on metabolism of carbohydrate, protein and lipid.  
6. Students will analyze structural functional relationships of genes and proteins from bacteria to eukaryotes. |
| 10. 19MBU202 | Microbial Physiology And Metabolism | 1. The students will be able to understand and predict the various metabolic reactions in microbial cell.  
2. This will make them predict the intermediate products which can be employed in industrial production processes.  
3. Students will understand the growth, nutrition and environmental factors  
4. Students able to assess the prokaryotes by observing the biochemical reaction  
5. This course will support them to interpret the fermentation using microbes  
6. Able to summarize the nutrients uptake system in the prokaryotes |
| 11. 19MBU203 | Microbial Genetics               | 1. This course provided candidates with basic knowledge and understanding of Molecular Biology with special reference to microbial genome.  
2. Students undertaking this course will be able to describe the nature of molecular world and its application in modern Microbiological sectors.  
3. Students able to understand the properties, structure and function of genes in microorganism at the molecular level  
4. Describe the importance of genetic code and operon concept |
|   |   | 5. Discuss the molecular mechanisms underlying mutations and repair mechanisms  
|   |   | 6. Able to summarize the concept of recombination, linkage mapping and elucidate the gene transfer mechanisms in prokaryotes and eukaryotes |
| 12. | 19MBU211 | **Basic Biochemistry - Practical II**  
|   |   | 1. Students will get practical knowledge about various techniques used in Biochemistry.  
|   |   | 2. Students will evaluate the protein and cholesterol  
|   |   | 3. Able to purify the compounds using chromatography  
|   |   | 4. Students able to separate the amino acid and sugar using thin layer chromatography  
|   |   | 5. Able to discuss about biochemical compound and its estimation using standard method  
|   |   | 6. Students able to separate the plant pigments |
| 13. | 19MBU212 | **Microbial Physiology And Metabolism – Practical**  
|   |   | 1. The students will be able to analyze the bacteria growth and growth condition  
|   |   | 2. Able to identify the various factors for optimal growth of *E. coli*  
|   |   | 3. Understand the basic microbial structure and functions of various physiological groups of prokaryotes.  
|   |   | 4. Able to utilize the various Culture media in the proper physical condition for fermentation  
|   |   | 5. Able to explain the microbial metabolism – Autotrophy and heterotrophy modes of nutrition  
|   |   | 6. Students able to understand the physical and chemical growth requirements of bacteria and thermal death time of bacteria. |
| 14. | 19MBU213 | **Microbial Genetics - Practical**  
|   |   | 1. Students undertaking this practical shall be able to describe the key concept in the basic Microbial Genetics  
|   |   | 2. Effectively understand the implication of mutation and its characteristics.  
|   |   | 3. Further, the experiments would allow students to recall and relate the information gained from Microbial Genetics theory paper and skills associated with it  
|   |   | 4. Students able demonstrate the gene transfer techniques  
|   |   | 5. Students can estimate the genetic materials  
|   |   | 6. Able to distinguish the plasmid and Genomic DNA. |
| 15. | 19AEC201 | **Environmental Studies**  
|   |   | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
|   |   | 2. Master core concepts and methods from economic, political, and social analysis as |
they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world

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<tr>
<th></th>
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<th>Virology</th>
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<tbody>
<tr>
<td>16.</td>
<td>19MBU301</td>
<td>This paper will have clear understanding the role of various in plant, animal and human disease</td>
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<td></td>
<td>Candidate able to understand their skill based various mechanisms to enter and escape from host.</td>
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<td></td>
<td></td>
<td>Comprehend the intricate interaction between viruses and host cells</td>
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<td>Understand the interactions between viruses and the host immune system</td>
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<td>It will explain the terms Oncogenes and tumour suppressor genes, and how tumour viruses interact with these products and their intersecting pathways and cause oncogenesis.</td>
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<td></td>
<td>Explain vaccine strategies and mechanisms of antiviral drugs and interferons</td>
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<th>Food And Dairy Microbiology</th>
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<tbody>
<tr>
<td>17.</td>
<td>19MBU302</td>
<td>Provides job-oriented information about the role of microorganisms in many foods, and beverage industries both in production and spoilage processes.</td>
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<td>Develop job-based output on industrial based technologies on Food microbiology.</td>
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<td>It will explain the interactions between microorganisms and the food environment, and factors influencing their growth and survival.</td>
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<td>Discuss the microbiology of different types of food commodities.</td>
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<td></td>
<td>Students are able to identify the pathogens from spoiled food</td>
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<td></td>
<td>Explain why microbiological quality control programmes are necessary in food production.</td>
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<tr>
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<th>Industrial Microbiology</th>
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<tbody>
<tr>
<td>18.</td>
<td>19MBU303</td>
<td>Provides knowledge in the large scale production of industrial product, providing the trends to cater the needs of industry.</td>
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<tr>
<td></td>
<td></td>
<td>This will help the students to enhance their</td>
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</table>
employment knowledge on microbiology based commercial products.
3. The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.
4. This course covers the principles of various processes associated with the production and recovery of different bio-products derived from microorganisms.
5. Students are able recover the different bio-products from microorganisms.
6. The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.

| 19. 19MBU304A | Microbial Quality Control In Food And Pharmaceutical Industries | 1. Imparts skilled knowledge on good manufacturing practices and food spoilage of different types of foods.
2. Develop skills on Food and drug based microbiological analysis.
3. To encourage students to the entrepreneurs and develop the capacity for setting up small scale enterprises with respect to food and pharmaceuticals within the country.
4. To organize functions for creating awareness about the importance of safe processed nutritious food.
5. To provide diagnostic analysis of food and pharmaceutical products.
6. The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites. |

| 20. 19MBU304B | Microbial Diagnosis In Health Clinic | 1. Provides employment knowledge to identify the common infectious agents with the help of laboratory procedures and use antimicrobial sensitivity tests to select suitable antimicrobial agents.
2. It describes the basic mechanisms of pathogenesis of infectious diseases.
3. It explains the basic principles of diagnosis, antimicrobial treatment, prevention and control of infectious diseases in the hospital and community.
4. It help the students to understand the host immune system and explain the host response to infection
5. Understand and interpret basic laboratory tests for the diagnosis of infectious diseases.
6. Apply the principles of molecular and immunological techniques for the diagnosis of infectious diseases. |

<p>| 21. 19MBU311 | Virology–Practical | 1. Upon paper completion, students will have skill based knowledge on structure of plants, animal, bacteria and viruses. |</p>
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<tr>
<td>2.</td>
<td>This paper also enables the student on isolation, propagation of various viruses.</td>
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<td>3.</td>
<td>It will help the students to understand the plant and animal viruses.</td>
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<td>4.</td>
<td>Students can distinguish the viruses according to their characteristic features.</td>
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<td>5.</td>
<td>It will explain the research activities involved in virology studies.</td>
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<td>6.</td>
<td>Skill based viral analysis can be performed in medical research.</td>
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<tr>
<th></th>
<th>19MBU312</th>
<th>Food And Dairy Microbiology – Practical</th>
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<tbody>
<tr>
<td>1.</td>
<td>Provides necessary entrepreneurial information on the food, dairy Microbiology in safety and quality perspective.</td>
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<tr>
<td>2.</td>
<td>It will help to study the importance in the prevention of contamination that might be caused by the microorganisms.</td>
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<td>3.</td>
<td>To Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries.</td>
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<td>4.</td>
<td>Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation.</td>
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<td>5.</td>
<td>Students can able to understand of the basis of food safety regulations and Discuss the rationale for the use of standard methods and procedures for the microbiological analysis of food.</td>
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<td>6.</td>
<td>Acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems.</td>
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<tr>
<th></th>
<th>19MBU313</th>
<th>Industrial Microbiology – Practical</th>
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<tbody>
<tr>
<td>1.</td>
<td>Provides knowledge in the large scale production of industrial product, and teaches the modern employment trends to cater the needs of industry.</td>
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<tr>
<td>2.</td>
<td>Students will differentiate the types of fermentation processes.</td>
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<td>3.</td>
<td>Understand the biochemistry of various fermentations.</td>
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<td>4.</td>
<td>Identify techniques applicable for Improvement of microorganisms based on known biochemical pathways and regulatory mechanisms.</td>
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<td>5.</td>
<td>Comprehend the techniques and the underlying principles in downstream processing.</td>
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<td>6.</td>
<td>Students can able to explore the practical skills in research activities.</td>
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<tr>
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<th>19MBU314A</th>
<th>Microbial Quality Control In Food And Pharmaceutical Industries – Practical</th>
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<tbody>
<tr>
<td>1.</td>
<td>This paper imparts skilled knowledge on good manufacturing practices and food spoilage of different types of foods.</td>
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<td>2.</td>
<td>Students can develop their entrepreneurial skills in food and pharma sectors.</td>
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<tr>
<td>3.</td>
<td>Good Manufacturing Practices (GMP) and associated guidelines for drugs, natural</td>
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</table>
1. Acquire knowledge to identify the common infectious agents with the help of laboratory procedures and use antimicrobial sensitivity tests to select suitable antimicrobial agents on the basis of employment.
2. Helps to understand the use of lab animals in medical field.
3. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.
4. Explain the methods of microorganism’s control, e.g. chemotherapy & vaccines. Solve problems in the context of this understanding.
5. Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures.
6. It will help the students to understand the general bacteriology and microbial techniques for isolation of pure cultures of Microorganisms.

26. 19MBU401 Immunology

1. Introducing the employment aspect of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.
2. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity
3. Develop understanding about immune system, antigen antibody interactions.
4. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.
5. Students can able to perform basic immunological assays.
6. It will distinguish fundamental knowledge on immunology and its advancement

27. 19MBU402 Medical Microbiology

1. It provides the ability to characterize, isolate and identify different microbes.
2. It includes a detailed study of characterization, etiology, pathogenicity, clinical systems, and laboratory diagnosis of disease causing Microorganisms.
3. Upon completion, students gained the
<table>
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<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 28. | 19MBU403 | Environmental Microbiology | 1. It provides a comprehensive overview of biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.  
2. Students will get the basic knowledge how to prepare and perform sampling and microbial analyses for the environmental studies.  
3. Critically discuss the need for environmental microbiology and agricultural microbiology and explain their limitations.  
4. Clarify application of microorganisms in varied fields of agricultural and environmental microbiology like bioremediation, biofertilizers and waste water treatment.  
5. Analyse various aspects of N2 fixation, Phosphate solubilization, PGPR, biodegradation and bioremediation mechanisms provided by microbes.  
6. Describe role of microorganism in recycling soil nutrients, biodegradation of complex plant polymers, sustaining and improving plant growth through improving nutrient availability. |
| 29. | 19MBU404A | Biofertilizers And Biopesticides | 1. This course has been designed to provide the student knowledge about eco-friendly product which play a crucial role in determining its future use and applications in environmental management.  
2. Provides detailed entrepreneurial idea about biofertilizer production and plant disease.  
3. To produce and impart training of eco-friendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.  
4. To demonstrate the know-how technology pertinent to microbiological and physico-chemical analyses of soil samples and their assessment.  
5. To demonstrate the low cost media preparation and cultural practices in biofertilizer / biopesticide production.  
6. Students can able to develop fundamental aspects of to seed/seed material/seedlings/soil/waste matter/crop residues in order to increase the population |
<p>| 30. | 19MBU404B | Recombinant DNA Technology | 1. Imparts the entrepreneurial concepts of rDNA technology and their applications and |</p>
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<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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</table>
| 31. 19MBU411 | Immunology – Practical | 1. Introducing the science of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.  
2. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity  
3. Develop understanding about immune system, antigen antibody interactions.  
4. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.  
5. After course completion, students can apply the knowledge in further studies and higher education.  
6. Knows the concepts of advanced immunological assays |
| 32. 19MBU412 | Medical Microbiology - Practical | 1. It provides the entrepreneurial ability to characterize, isolate and identify different microbes.  
2. It includes a detailed study of characterization, etiology, pathogenicity, clinical systems, and laboratory diagnosis of disease-causing Microorganisms.  
3. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.  
5. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.  
6. Explain the methods of microorganisms control, e.g. chemotherapy & vaccines. Solve problems in the context of this understanding.  ▪ Demonstrate practical skills |
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<th>Course Title</th>
<th>Objectives</th>
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</table>
| 33 | 19MBU413    | Environmental Microbiology – Practical           | 1. Provides a comprehensive overview of biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.  
2. Understand various plant microbes interactions especially rhizosphere and their applications especially the biofertilizers and their production techniques  
3. Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems  
4. waste water treatment and bioremediation  
5. Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission  
6. Comprehend the various methods to determine the Sanitary quality of water and sewage treatment methods employed in waste water treatment |
| 34 | 19MBU414A  | Biofertilizers And Biopesticides - Practical      | 1. Provide the student knowledge about eco-friendly product which play a crucial role in determining its future use and applications in environmental management.  
2. Provides detailed idea about biofertilizer production and plant disease.  
3. Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems  
4. waste water treatment and bioremediation  
5. Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission  
6. Comprehend the various methods to determine the Sanitary quality of water and sewage treatment methods employed in waste water treatment |
| 35 | 19MBU414B  | Recombinant DNA Technology – Practical            | 1. Imparts the concepts of rDNA technology and their applications and Acquire knowledge on the applications of genetic engineering.  
2. Students will develop understanding about isolation and enumeration of microorganisms from various samples.  
3. Microbial identification and characterization using a number of approaches will be well understood.  
4. Acquainted with molecular modification approaches that encompass extraction, purification, quantification and augmentation. |
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<tr>
<td>5.</td>
<td>To give basic understanding of microbial genetic manipulations</td>
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<td>6.</td>
<td>To understand working of different laboratory equipment’s used in microbiological laboratories</td>
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<td>36.</td>
<td>19MBU501A</td>
<td>Management Of Human Microbial Diseases</td>
</tr>
<tr>
<td>1.</td>
<td>Develop skills for identification, classification, and characterization of various pathogens.</td>
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<tr>
<td>2.</td>
<td>To describe and practice the basic principles of chemotherapy and disinfection through laboratory exercises accompanied by case studies.</td>
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<td>3.</td>
<td>Upon completion, students gained the knowledge of most common medically important organism and the infections they cause.</td>
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<td>4.</td>
<td>Different approaches, techniques and tools used to identify pathogens and control them.</td>
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<td>5.</td>
<td>Diagnostic approaches for microbial pathogens</td>
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<tr>
<td>6.</td>
<td>Developing efficient vaccines and new drugs.</td>
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<tr>
<td>37.</td>
<td>19MBU501B</td>
<td>Microbiological Analysis Of Air And Water</td>
</tr>
<tr>
<td>1.</td>
<td>Provides employability skills involved in the air and water analysis</td>
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<tr>
<td>2.</td>
<td>Characterization of microorganisms from water and air samples</td>
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<tr>
<td>3.</td>
<td>Students will get the basic knowledge how to prepare and perform sampling and microbial analyses to determine the abundance, growth rate and microbial community composition together with the basic environmental parameters.</td>
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<tr>
<td>4.</td>
<td>Validation for equipment, methods, cleaning and process</td>
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<tr>
<td>5.</td>
<td>Students can develop their entrepreneurial skills in analysis of air and water sample.</td>
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<tr>
<td>6.</td>
<td>Learning the basic principles of microbiological analysis of environmental sector</td>
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</tr>
<tr>
<td>38.</td>
<td>19MBU502A</td>
<td>Biomathematics And Biostatistics</td>
</tr>
<tr>
<td>1.</td>
<td>Students get an idea about collection, interpretation and presentation of statistical data.</td>
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<tr>
<td>2.</td>
<td>Statistics, a branch of applied Mathematics, is regarded as mathematics applied to observational data.</td>
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<tr>
<td>3.</td>
<td>Conceivably everything dealing with the collection, processing, analysis and interpretation of numerical data belongs to the domain of statistics.</td>
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<tr>
<td>4.</td>
<td>To introduce students to the use of R for the analysis of biological processes and data, including simple computer programming.</td>
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<tr>
<td>5.</td>
<td>have an enhanced knowledge and understanding of mathematical modelling and statistical methods in the analysis of</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<tr>
<td>39. 19MBU502B</td>
<td>Bioinformatics</td>
<td>1. Provides computational skill on search engines and various software tools involved in bioinformatics</td>
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<td>2. It will impart computational based techniques which includes genomics and proteomics in Bioinformatics.</td>
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<td></td>
<td>3. Retrieve information from available databases and use them for microbial identifications and drug designing.</td>
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<td>4. Gain ability to modify gene and protein structures in simulated systems.</td>
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<td>5. Introduction to the basics of sequence alignment and analysis.</td>
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<td></td>
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<td>6. Describe about the different types of Biological databases.</td>
</tr>
<tr>
<td>40. 19MBU503A</td>
<td>Instrumentation And Biotechniques</td>
<td>1. The students with an opportunity to develop skill on the bioinstrumentation and concepts of principles and applications.</td>
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<tr>
<td></td>
<td></td>
<td>2. Define and explain various fundamentals of spectroscopy, qualitative and quantitative analysis and characterize functionalities of biomolecules by using spectroscopic techniques.</td>
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<td></td>
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<td>3. Explain the various separation techniques and its instrumentation.</td>
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<td>4. Describe the principle and working of various radiation detectors.</td>
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<td>5. Evaluate the various types &amp; applications of chromatography and electrophoresis.</td>
</tr>
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<td></td>
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<td>6. Appreciate the working principles and applications of Microscopy.</td>
</tr>
<tr>
<td>41. 19MBU503B</td>
<td>Plant Pathology</td>
<td>1. This will enable for learning the techniques to save endangered species which will be useful for mankind.</td>
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<tr>
<td></td>
<td></td>
<td>2. Describe the concepts of what constitutes disease in plants.</td>
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<td></td>
<td>3. Identify major principles of plant pathology.</td>
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<td></td>
<td>4. Recognize the etiological agents of disease.</td>
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<td></td>
<td>5. Employ methods to diagnose and manage a wide range of plant diseases.</td>
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<td></td>
<td></td>
<td>6. Describe aspects of integrated pest management.</td>
</tr>
<tr>
<td>42. 19MBU504A</td>
<td>Microbial Biotechnology</td>
<td>1. This paper imparts knowledge on applications of microorganisms in various fields and helps to gain employability in pharmaceutical industries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Describe about different sewage treatment methods employed in waste water treatment.</td>
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</tbody>
</table>
3. Learn about the global environmental problems.
4. To provide a fundamental knowledge about the various scopes in environmental and industrial studies.
5. Learn about the applications of microbes in biotransformations, therapeutic and industrial biotechnology
6. Describe aspects of genetically engineered microbes for industrial application

43. 19MBU504B Inheritance Biology
1. This paper imparts knowledge on the different aspects of genetics and pedigree analysis.
2. Understand the central dogma of molecular biology and the genome of prokaryotic and eukaryotic microorganisms.
3. To gain knowledge about the microbial genetics and central dogma of molecular biology
4. Students will understand the cellular components underlying mitotic cell division.
5. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.
6. To describe applications and techniques of modern genetic technology, as well as select the correct techniques to solve practical genetic problems.

44. 19MBU511A Management Of Human Microbial Diseases - Practical
1. Involves the identification, classification, and characterization of pathogenic species.
2. This paper imparts employability in hospital laboratories.
3. Properly use aseptic techniques, including sterilization. Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria.
4. Basics in microbiology course is designed as an interdisciplinary course to acquaint the students of different streams with a very basic knowledge and understanding of microbes, pathogens and their control Learning methods for antimicrobial susceptibility testing
5. In this course the students will observe and perform experiments related to clinical microbiology and virology which will enhance their laboratory skills, and scientific knowledge.

45. 19MBU511B Microbiological Analysis Of Air And Water – Practical
1. This paper teaches different laboratory skills of analyzing air and water.
2. Hand on training of the general equipment used in microbiology laboratory
<table>
<thead>
<tr>
<th>46.</th>
<th>19MBU512A</th>
<th>Biomathematics And Biostatistics - Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. Develop capability to perform different gene transfer methods in microbes</td>
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<td></td>
<td>4. Characterization of microorganisms from water and air samples</td>
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<td></td>
<td>5. Enumeration of bacteria and fungi from air by membrane filtration technique</td>
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<td></td>
<td>6. Gain knowledge about water pollution and waste water treatments</td>
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<thead>
<tr>
<th>47.</th>
<th>19MBU512B</th>
<th>Bioinformatics - Practical</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1. Students get an idea about collection, interpretation and presentation of statistical data.</td>
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<tr>
<td></td>
<td>2. Statistics help in providing data as well as tools to analyze the data.</td>
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<td></td>
<td>3. Some powerful techniques are index numbers, time series analysis, and also forecasting.</td>
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<td></td>
<td>4. Statistical knowledge helps you use the proper methods to collect the data, employ the correct analyses, and effectively present the results.</td>
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<td></td>
<td>5. To show how mathematics, statistics and computing can be used in an integrated way to analyse biological systems.</td>
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<td></td>
<td>6. Conceivably everything dealing with the collection, processing, analysis and interpretation of numerical data belongs to the domain of statistics.</td>
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<thead>
<tr>
<th>48.</th>
<th>19MBU513A</th>
<th>Instrumentation And Biotechniques – Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Offers the students with an opportunity to gain practical skills on the bioinstrumentation and concepts of principles and applications.</td>
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<td>2. Evaluate the various types &amp; applications of chromatography and electrophoresis.</td>
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<td></td>
<td>3. Evaluate the various types &amp; phase contrast microscopy and Electron microscopy</td>
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<td></td>
<td>4. Explain the various separation techniques and its instrumentation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Hand on training of the general equipment</td>
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<tr>
<td>49. 19MBU513B</td>
<td>Plant Pathology – Practical</td>
<td></td>
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<tr>
<td>1. This will enable for learning the techniques to save endangered species which will be useful for mankind.</td>
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<tr>
<td>2. Identify major principles of plant pathology.</td>
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<tr>
<td>3. Demonstration of fungal, bacterial and viral plant pathogens.</td>
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<tr>
<td>4. Recognize the etiological agents of disease.</td>
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<td>5. Employ methods to diagnose and manage a wide range of plant diseases.</td>
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<tr>
<td>6. To teach the students about the different groups of insects that vector plant pathogens, vector-plant pathogen interaction, management of vectors for controlling diseases.</td>
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<thead>
<tr>
<th>50. 19MBU514A</th>
<th>Microbial Biotechnology - Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Impart knowledge on applications of microorganisms in various fields</td>
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<tr>
<td>2. Provides skill development on microbial products.</td>
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<tr>
<td>3. To study the immobilization techniques and fungal pigment production.</td>
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<td>4. Develop a xylanase and lipase production technology.</td>
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<td>5. Demonstration of algal single cell proteins.</td>
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<tr>
<td>6. State of art knowledge about various methodological and analytic approaches that are used within the specialization.</td>
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<thead>
<tr>
<th>51. 19MBU514B</th>
<th>Inheritance Biology - Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Imparts knowledge on the different aspects of genetics and pedigree analysis.</td>
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<tr>
<td>2. Students will understand the cellular components underlying mitotic cell division</td>
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<tr>
<td>3. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.</td>
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<td>4. Identify the organs and tissue systems of plants, and explain their respective function</td>
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<td>5. Understand how molecular cell biology forms the foundation of biotechnology</td>
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<td>6. Students will learn about DNA, RNA and the molecular events that govern cell functions.</td>
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<thead>
<tr>
<th>52. 19MBU601A</th>
<th>Mushroom Cultivation</th>
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</thead>
<tbody>
<tr>
<td>1. Able to Know the architecture of mushrooms</td>
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<tr>
<td>2. To know the methods used to cultivate mushroom.</td>
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<tr>
<td>3. Students are able to predict where the mushroom placed in vegetable kingdom</td>
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<tr>
<td>4. Able to cultivate mushrooms from agricultural waste.</td>
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<tr>
<td>5. Have an idea about packaging and storing.</td>
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<tr>
<td>6. Have understand nutritional value of mushrooms.</td>
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<tr>
<th>53. 19MBU601B</th>
<th>Food Fermentation Techniques</th>
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</thead>
<tbody>
<tr>
<td>1. Students Imparts knowledge on various microorganisms involved in food</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
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<td>-------------</td>
<td>--------------------------------------------------</td>
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</tbody>
</table>
| 54. 19MBU602A | Biosafety And Intellectual Property Rights       | 1. Provides knowledge on safety aspects in biological laboratory and to create awareness on the Intellectual property rights and patenting of biotechnological processes.  
2. To gain knowledge on steps of a patenting process and the role of biosafety committee.  
3. To emphasize the components and design of laboratory.  
4. Provide learning opportunities to critically evaluate research methodology and findings  
5. Enable students to acquire expertise in the use and application of the methods of data collection and analysis.  
6. Enable students to be reflexive about their role and others' roles as researchers |
| 55. 19MBU602B | Microbes In Sustainable Agriculture And Development | 1. Develops the programmatic activities in sustainable agriculture and food systems  
2. Able to relate their knowledge about ecology to its relevance in sustainable agriculture  
3. Provides detailed idea about biofertilizer production and develop entrepreneur skill related to agriculture field.  
4. Understand on soil characteristics and biogeochemical cycling.  
5. Students able to the uses of microorganisms as bio control agents.  
| 56. 19MBU603A | Cell Biology                                     | 1. Basic concept of cell structure, membrane, cellular functions of different types of cell, modes of cellular signalling and signal amplification.  
2. Students able to annotating cell organization of prokaryotic and Eukaryotic.  
3. Students able to paraphrase cell death and cell renewal.  
4. Able to bullet pointing protein sorting and transport  
5. Expertise in interpreting cell internal... |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
</table>
| 57. 19MBU603B| Molecular Biology                      | 1. Explores technologies using molecular biology, embryo manipulation, cell and tissue culture.  
2. Manipulate the genomes of animals for ways to improve the livestock for food production and biomedical purpose.  
3. Develop the skills in molecular biology.  
4. Executing concept of RNA splicing and mRNA and its significance.  
5. Students able to inferring various model of DNA replication  
6. Students able to contrast translational machinery. |
| 58. 19MBU611A| Mushroom Cultivation - Practical       | 1. To impart knowledge on various mushrooms and its cultivation techniques to became an entrepreneur.  
2. Students able to predict classification of edible mushroom.  
3. Able to cultivate spawn from waste materials.  
4. Have a knowledge in sterilization and handling of mushroom.  
5. Students understand the application of mushroom biotechnology.  
6. Students understand the characteristics and importance of mushrooms |
| 59. 19MBU611B| Food Fermentation Techniques – Practical| 1. To impart knowledge on various microorganisms involved in food fermentation.  
2. To nurture the student to gain employability in industrial area.  
3. Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods.  
4. Understand the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented food products – dairy, pickles, Legume and cereal based food products  
5. Have an idea to isolate beneficial microorganisms from spoiled food.  
6. Identify methods to control deterioration and spoilage |
| 60. 19MBU612A| Biosafety And Intellectual Property Rights – Practical | 1. Able to understand safety aspects in biological laboratory.  
2. To create awareness on the Intellectual property rights and patenting of biotechnological processes.  
3. To equip students with a basic understanding of the underlying principles of quantitative and qualitative patenting methods. |
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<tr>
<td>4.</td>
<td>Provide students with in-depth training on the conduct and management of patent filing from inception.</td>
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<tr>
<td>5.</td>
<td>Enable students to acquire expertise in the use and application of the methods of data collection and analysis.</td>
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<td>6.</td>
<td>Enable students to be reflexive about their role and others' roles as researchers.</td>
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<tr>
<td><strong>61.</strong> 19MBU612B</td>
<td><strong>Microbes In Sustainable Agriculture And Development – Practical</strong></td>
<td>1. Able to relate their knowledge about ecology to its relevance in sustainable agriculture.</td>
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<td>2. Provides detailed idea about biofertilizer production and develop entrepreneur skill related to agriculture field.</td>
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<td></td>
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<td>3. Able to device biogas plant.</td>
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<td>4. Students will be annotate various zone in soil profile.</td>
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<td>5. Students will be isolate various degrading microorganisms for agricultural use.</td>
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<td>6. Criticize the role of soil microbes in crop production.</td>
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<td><strong>62.</strong> 19MBU613A</td>
<td><strong>Cell Biology - Practical</strong></td>
<td>1. To understand the basic concept of cell structure, membrane, cellular functions of different types of cell.</td>
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<td>2. Able to analyses modes of cellular signalling and signal amplification.</td>
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<td>3. Able to categorize cell internal organs.</td>
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<td>4. Able to retrieve polyloid stage in vegetables.</td>
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<td>5. Able to predict cancer cells through photomicrograph.</td>
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<tr>
<td><strong>63.</strong> 19MBU613B</td>
<td><strong>Molecular Biology - Practical</strong></td>
<td>1. Explores technologies using molecular biology, cell and tissue culture to manipulate the genomes of animals for ways.</td>
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<tr>
<td></td>
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<td>2. Develop the skills in molecular biology.</td>
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<td></td>
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<td>3. Student capable of explaining process involved in genetic changes and mutations.</td>
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<td>4. The identification of genetic regulatory mechanism and distinguishing different mechanism of gene regulation.</td>
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<td>5. The design of different techniques based on utilizing the genetic mechanism of microbes.</td>
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<td>6. Hand on experience of different microbial genetic modification strategies.</td>
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Name of the Department: **Microbiology**

**Course:** M.Sc. Microbiology

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<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</table>
| 1.     | 19MBP101    | Fundamentals Of Microbiology And Classification | 1. Understand the basic microbial structure and functions of various physiological groups of prokaryotes and eukaryotes.  
2. Learn the theory and practical skills in microscopy handling and staining techniques know various culture media and their applications.  
3. Study microbial nutrition - Autotrophy and heterotrophy modes of nutrition.  
4. Identify the unknown organisms by using microbial tools.  
5. Demonstrate electricity generation from the organic matter.  
6. Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism – Autotrophy and heterotrophy |
| 2.     | 19MBP102    | Microbial Physiology and Metabolism            | 1. The students will be able to understand and predict the various metabolic reactions in microbial cell.  
2. This will make them to predict the intermediate products which can be employed in industrial production processes.  
3. The students will be able to know how bacterial and archaeal structure lead to function, how metabolic processes are regulated.  
4. The course makes them to understand how microbes respond to environmental stressors, and how microbes can be manipulated to enhance their growth or the production of desired products.  
5. Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement  
6. The students will be able to understand how the organisms communicate to the population by using various mechanisms. |
| 3.     | 19MBP103    | Molecular Genetics                            | 1. This course allows the candidate to recollect the basics of molecular genetics and apply a cognitive thinking on the application-oriented sectors of genetics.  
2. Students would be able to practically apply this knowledge in different sectors with possibilities ranging from the treatment of human diseases to the development of novel medicines.  
3. A thorough understanding of the process of translation and operons along with recombination of DNA.  
5. Have a conceptual knowledge about DNA as a genetic material, enzymology, and replication   |
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<td><strong>4.</strong></td>
<td>19MBP104</td>
<td>Bioinstrumentation</td>
</tr>
<tr>
<td>1.</td>
<td>This enables students to be able to explain bioinstrumentation techniques, design and application.</td>
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<tr>
<td>2.</td>
<td>To know the concepts and operation of various lab instruments and related terms.</td>
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<tr>
<td>3.</td>
<td>Acquire knowledge and lab skills to perform experiments in laboratory.</td>
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<td>4.</td>
<td>Connect the concepts of physics, chemistry and engineering principles in the instrumentation.</td>
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<tr>
<td>5.</td>
<td>The students will be able to know all the basic principles, technology and applications of various instruments in life science.</td>
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<td>6.</td>
<td>Comprehend the techniques and the underlying principles in bioinstrumentation.</td>
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<td><strong>5.</strong></td>
<td>19MBP105A</td>
<td>Marine Microbiology</td>
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<tr>
<td>1.</td>
<td>Capable of describing and explaining both biological interaction processes and their importance to ecosystems.</td>
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<tr>
<td>2.</td>
<td>To acquire knowledge of the most common research methods used to develop our knowledge of biological processes.</td>
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<tr>
<td>3.</td>
<td>Learn to work independently in collecting and analysing scientific data, both in the field and in the laboratory.</td>
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<td>4.</td>
<td>Understand the architecture of marine ecosystem and its essential role</td>
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<td>5.</td>
<td>Specify the biological significance of biomolecules in metabolism</td>
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<td>6.</td>
<td>To understand computer applications and Bioinformatics</td>
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<tr>
<td><strong>6.</strong></td>
<td>19MBP105B</td>
<td>Computer Applications And Bioinformatics</td>
</tr>
<tr>
<td>1.</td>
<td>The students will have an understanding about the information on the search engines and various software tools involved in bioinformatics.</td>
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<td>2.</td>
<td>Additional knowledge on different operating systems would enable the candidate to work with versatility.</td>
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<td>3.</td>
<td>Provides computational skill on search engines and various software tools involved in bioinformatics</td>
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<tr>
<td>4.</td>
<td>It will impart computational based techniques which includes genomics and proteomics in Bioinformatics.</td>
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<tr>
<td>5.</td>
<td>Retrieve information from available databases and use them for microbial identifications and drug designing</td>
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<tr>
<td>6.</td>
<td>Gain ability to modify gene and protein structures in simulated systems</td>
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<td><strong>7.</strong></td>
<td>19MBP105C</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>1.</td>
<td>Understand the structures of enzymes, proteins, carbohydrates and fats</td>
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<tr>
<td>2.</td>
<td>Understand the functions of biomolecules</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Analyze the process of metabolism</td>
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<tr>
<td>4.</td>
<td>Understand of nucleic acids and their importance to combine and analyses information.</td>
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<td>5.</td>
<td>Explain the structure and mechanism of enzyme</td>
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<td>8.</td>
<td>19MBP111</td>
<td>Basic Practical – I</td>
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<td></td>
<td></td>
<td>1. A student able to skillfully isolate and identify the microorganisms using different microbiological techniques needed in laboratory.</td>
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<td>2. To enhance the ability of the student skills in medical laboratories and research sectors.</td>
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<td>3. Demonstrate practical skills in the use of tools, technologies and methods common to microbiology.</td>
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<td>4. To apply the scientific method and hypothesis testing in the design and execution of experiments</td>
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<td>5. To develop theoretical and practical skills in the design and execution of experiments.</td>
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<td>6. Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.</td>
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<td>9.</td>
<td>19MBP112</td>
<td>Basic Practical – II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. A student undertaking this course will be learning the principles behind the molecular techniques which would enable him to work in competent molecular biology-based laboratories.</td>
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<td>2. Imparts knowledge on the different aspects of genetics and pedigree analysis.</td>
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<td></td>
<td>3. Students will apply their knowledge of to selected examples of changes or losses in cell function.</td>
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<td>4. Identify the organs and tissue systems of plants, and explain their respective function.</td>
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<td>5. Impart knowledge on applications of microorganisms in various fields</td>
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<td>6. Provides skill development on microbial products.</td>
</tr>
<tr>
<td>10.</td>
<td>19MBP201</td>
<td>Virology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Describe the structure and replication strategies of the viruses, the processes of entry into cells, control of gene transcription and where relevant translation and gene product stability, control of and mechanism of genome replication, virion assembly and egress from the cell.</td>
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<tr>
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<td>2. Define the process of virus latency and describe in molecular terms control of the process and activation of viral genomes during reactivation.</td>
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<td>3. Describe the growth behaviour differences between normal cells and cells transformed by oncogenic DNA and RNA viruses.</td>
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<td>4. Integrate experimental strategies learned in the context of viral systems into the design of experiments involving other systems.</td>
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<td>5. Discern the replication strategies of representative viruses from the seven Baltimore classes</td>
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<td>6. To understand the interactions between viruses and the host immune system</td>
</tr>
<tr>
<td>11.</td>
<td>19MBP202</td>
<td>Medical Bacteriology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.</td>
</tr>
</tbody>
</table>
|   |   | 2. Application of molecular techniques to medical microbiology; biochemical and genetic
<table>
<thead>
<tr>
<th>12.</th>
<th>19MBP203</th>
<th>Biostatistics And Research Methodology</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Apply basic statistical concepts commonly used in health and medical sciences</td>
</tr>
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<td>2. Use basic analytical techniques to generate results</td>
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<td>3. Interpret results of commonly used statistical analyses in written summaries.</td>
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<td>4. Demonstrate statistical reasoning skills correctly and contextually and this course will support the employment in various bioscience sector.</td>
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<td>5. The analytics of data, probability, and hypothesis testing of samples</td>
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<td>6. The essential role of statistics in present, future use and applications of Biology</td>
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<tr>
<th>13.</th>
<th>19MBP204</th>
<th>Environmental And Agricultural Microbiology</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. This course will provide the student insights into these invaluable areas of Environmental microbiology, which play a crucial role in determining its future use and applications in environmental management.</td>
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<td></td>
<td></td>
<td>2. Students able to know detailed idea about biofertilizer production and plant disease.</td>
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<td>3. Students able to become Entrepreneur after understanding this process and product development.</td>
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<td>4. This course will determine microbial role in nutrient cycling</td>
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<td>5. This course can able to determine water quality.</td>
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<td>6. It will explain the degradation of natural organic compounds and selected pollutants in the environment.</td>
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<tr>
<th>14.</th>
<th>19MBP205A</th>
<th>Cell Biology</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Students upon completion of this paper will have clear knowledge on various cellular functions such as transportation and signalling.</td>
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<td>2. It will enable the students to enter into cellular function level research for their future.</td>
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<td>3. Students will understand the cellular components underlying mitotic and meiotic cell division.</td>
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<td>15.</td>
<td>19MBP205B</td>
<td>Quality Assurance And Quality Control</td>
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<td>4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.</td>
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<td>5. Students will get the knowledge of common and advanced laboratory practices in cell and molecular biology</td>
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<td>6. Conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation, enzyme engineering, Application of enzymes in large scale industrial processes</td>
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<tr>
<td>16.</td>
<td>19MBP205C</td>
<td>Bioprocess Engineering</td>
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<tr>
<td></td>
<td></td>
<td>1. Set up and Assess Food Quality Assurance Plans.</td>
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<td></td>
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<td>2. Create and Critically Evaluate quality specifications for raw materials, and associated final product and appropriate packaging.</td>
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<td></td>
<td>3. Design and critically evaluate appropriate testing and recording procedures for raw materials and associated Final product.</td>
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<td>4. Design, and evaluate processing documentation including Standard Operating procedures.</td>
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<td>5. To realize the importance of significance of quality</td>
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<td>6. Identify requirements of quality improvement programs</td>
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<tr>
<td>17.</td>
<td>19MBP211</td>
<td>Advanced Practical – III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. This course will enable the students to design the various microbial fermentation products and their production, purification for various applications</td>
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<td></td>
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<td>2. To know the process protocol for the, synthesis and characterization of nanoparticles</td>
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<td>3. Explain the gene transfer methods for the production of transgenic animals</td>
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<td></td>
<td>4. Gain experimental knowledge to perform animal biotechnology related experiments</td>
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<td></td>
<td>5. Explain the application of biotechnology in medical and its allied fields, gene therapy, genetic counseling</td>
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<td></td>
<td>6. Address the bioethical issues &amp; concerned linked to medical biotechnology</td>
</tr>
<tr>
<td>18.</td>
<td>19MBP212</td>
<td>Advanced Practical – IV</td>
</tr>
</tbody>
</table>
|      |           | 1. This course provides the current medical aspects on the clinical diagnosis of infection providing the
combined treatment of bacteriology and virology.

2. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.

3. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.

4. The significance of bacterial genetic variation (in drug resistance, pathogenesis or virulence and variation, diagnosis, and vaccination), and manipulation of cloned DNA.

5. To know the Virulence of bacteria, bacterial virulence factors and their regulation.

6. To understand drug resistance, drug-bacteria relationship, clinical implications, and prevention.

<table>
<thead>
<tr>
<th>19.</th>
<th>19MBP301</th>
<th>Advanced Immunology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>To strengthen the technical skill on the immune system, their structure and classification, genetic control of antibody production, Types, structure of antigens and immunodiagnostics.</td>
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<tr>
<td>2.</td>
<td>To obtain knowledge of through Molecular immunology, hypersensitive immune reaction and Latest trends in immunology.</td>
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<tr>
<td>3.</td>
<td>Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity.</td>
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<tr>
<td>4.</td>
<td>Develop understanding about immune system, antigen antibody interactions.</td>
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<tr>
<td>5.</td>
<td>Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.</td>
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<tr>
<td>6.</td>
<td>Introducing the employment aspect of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.</td>
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</tbody>
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<thead>
<tr>
<th>20.</th>
<th>19MBP302</th>
<th>Food Microbiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Provides knowledge in the large-scale production of industrial product, providing the trends to cater the needs of industry.</td>
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<tr>
<td>2.</td>
<td>This will help the students to enhance their employment knowledge on microbiology based commercial products.</td>
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<tr>
<td>3.</td>
<td>The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.</td>
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<tr>
<td>4.</td>
<td>To encode the importance of the role of microorganisms in food industries both in beneficial and harmful ways.</td>
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<tr>
<td>5.</td>
<td>To obtain a good understanding of industrial microbiology and become qualified as microbiologist in food and other industries and candidate able to become entrepreneur after understanding this entire course.</td>
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<tr>
<td>21.</td>
<td>19MBP303</td>
<td>Medical Mycology And Parasitology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Explain why microbiological quality control programmes are necessary in food production.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Application of molecular techniques to medical microbiology; biochemical and genetic mechanisms of antimicrobial agent activity, microbial susceptibility and resistance to antimicrobial agents.</td>
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<tr>
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<td></td>
<td>3. Demonstrate an understanding of skin and respiratory tract infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment) by being able to identify a unknown organisms in clinical samples, and describe the pathogenesis of important pathogens.</td>
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<tr>
<td></td>
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<td>4. It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.</td>
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<td>5. To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue.</td>
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<td></td>
<td></td>
<td>6. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.</td>
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<tr>
<td>22.</td>
<td>19MBP304</td>
<td>Microbial Technology And Intellectual Property Rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. To learn the basic tools in recombinant technology</td>
</tr>
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<td></td>
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<td>2. To understand the various concepts of cloning vectors</td>
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<tr>
<td></td>
<td></td>
<td>3. To learn the cloning strategies</td>
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<td>4. To familiarize the students, with the principles of bioethical concepts</td>
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<td>5. To emphasize on IPR issues and need for knowledge in patents in biotechnology</td>
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<tr>
<td></td>
<td></td>
<td>6. To apply their knowledge in new product development</td>
</tr>
<tr>
<td>23.</td>
<td>19MBP305A</td>
<td>Biofertilizer And Biomanure Technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. This course has been designed to provide the student knowledge about eco-friendly product.</td>
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<tr>
<td></td>
<td></td>
<td>2. Product play a crucial role in determining its future use and applications in environmental management.</td>
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<tr>
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<td></td>
<td>3. Provides detailed idea about biofertilizer production and plant disease.</td>
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<td>4. To produce and impart training of eco-friendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.</td>
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<td>5. To demonstrate the know-how technology pertinent to microbiological and physico-chemical analyses of soil samples and their assessment.</td>
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<td></td>
<td>6. Provides detailed entrepreneurial idea about biofertilizer production and plant disease.</td>
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<tr>
<td>24.</td>
<td>19MBP305B</td>
<td>Laboratory Animal Care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Laboratory animal care provides the proper handling and care for various species of animals used in research, testing, and in education.</td>
</tr>
</tbody>
</table>
2. It extensively deals with the amended act on the Animal Welfare and the concept, availability, and use of research or testing methods that limit the use of animals or minimize animal distress.
3. This course content will enhance the employment in drug testing field.
4. Validation for equipment, methods, cleaning and process
5. Students can develop their entrepreneurial skills in analysis of pens design and environment.
6. Ethical knowledge for use of animals in research.

<table>
<thead>
<tr>
<th>25.</th>
<th>19MBP305C</th>
<th>Bio Nanotechnology</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Students get an idea about application of nanotechnology in biology.</td>
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<td>2. It provide analytical knowledge of trends and developments in the field of nanotechnology</td>
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<td>3. Acquire knowledge in nanotechnology and how it will support the employment greatly.</td>
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<td>4. Students able to construct hierarchy strategy in machine.</td>
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<td>5. Able to describe self-application and machine phase biotechnology.</td>
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<td>6. Students have an enhanced knowledge and understanding of chemical transformation and biomolecular sensing.</td>
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<tr>
<th>26.</th>
<th>19MBP311</th>
<th>Application Oriented Practical – V</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. This practical is to provide the student with a basic knowledge and technical skill of immunology and make them to understand the significance to human disease.</td>
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<td>2. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity</td>
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<td></td>
<td>3. Develop understanding about immune system, antigen antibody interactions.</td>
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<tr>
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<td></td>
<td>4. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.</td>
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<td>5. After course completion, students can apply the knowledge in further studies and higher education.</td>
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<td></td>
<td>6. Introducing the science of immunology and to study various types of immune systems their classification structure and mechanism of immune activation</td>
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<tr>
<th>27.</th>
<th>19MBP312</th>
<th>Application Oriented Practical – VI</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. This practical adds a technical skill and good understanding of industrial microbiology</td>
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<td></td>
<td></td>
<td>2. Students can develop the skills of an efficient microbiologist in food and beverage industries.</td>
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<td></td>
<td>3. Provides necessary entrepreneurial information on the food, dairy Microbiology in safety and quality perspective.</td>
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<td>4. It will help to study the importance in the prevention of contamination that might be caused by the microorganisms.</td>
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<td>5. To Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries</td>
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<td></td>
<td>6. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation</td>
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</table>
Name of the Department: **Physics**

**Course**: B.Sc. Physics

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1.     | 19PHU101    | Mechanics          | After successful completion of the course, the student is expected to  
1. To enable the students to understand the basic concepts of mechanics  
2. To understand the concepts of simple harmonic motion  
3. Parameters defining the motion of mechanical systems and their degrees of freedom.  
4. Study the interaction of forces between solids in mechanical systems.  
5. Application of the vector theorems of mechanics and interpretation of their results.  
6. Introduction to analytical mechanics as a systematic tool for problem solving. |
| 2.     | 19PHU102    | Properties of Matter and Acoustics | After successful completion of the course, the student is expected to  
1. Understanding the fundamental laws and principles of different areas of physics.  
2. To know the basic principles of properties of matter.  
3. To gain knowledge in the concepts of Gravitation, Osmosis and Diffusion  
4. Learn the basics of properties of matter, how Young’s modulus and rigidity modulus are defines and how they are evaluated for  
5. evaluate for different shapes of practical relevance  
6. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics. |
| 3.     | 19PHU103    | Mathematics - I    | On successful completion of this course, the students will be able to  
1. Solve simultaneous equations with the help of matrices.  
2. Mastery in the concepts of vector and scalar fields.  
3. Gain the intellectual knowledge of complex functions and their applications.  
4. Acquire fundamental knowledge in the techniques of differentiation.  
5. Know the properties of definite integrals.  
6. Acquire fundamental knowledge in Divergence of a vector |
| 4.     | 19PHU111    | Mechanics Practical | After successful completion of the course, the student is expected to  
1. Understand and analyze basic theory and principles of forces in mechanics  
2. Know forces their relationship to engineering applications  
3. Analyze motion, forces and motion, work and energy problems and their relationship to engineering applications |
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<tr>
<td>4.</td>
<td>Understand basic laws governing mechanics of a system.</td>
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<tr>
<td>5.</td>
<td>Determine the acceleration due to gravity using various methods.</td>
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<tr>
<td>6.</td>
<td>Determine the Moment of Inertia using various methods.</td>
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<td>5.</td>
<td>19PHU112</td>
<td>Properties of Matter and Acoustics Practical</td>
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<td></td>
<td>After successful completion of the course, the student is expected to</td>
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<td>1. Study the elastic behavior and working of torsional pendulum.</td>
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<td>2. Study the bending behavior of beams and analyse the expression for young's modulus.</td>
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<td>3. Understand about the surface tension and viscosity of fluid.</td>
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<td>4. Use different methods to determine the Young’s modulus of different materials.</td>
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<td>5. Use different methods to determine the Rigidity modulus of different materials.</td>
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<td>6. Experience the practical knowledge on different matters.</td>
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<tr>
<td>6.</td>
<td>19PHU113</td>
<td>Mathematics Practical – I</td>
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<tr>
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<td></td>
<td>On successful completion of this course, the student will be able to</td>
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<td></td>
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<td>1. Solve complicated matrix related problems like matrix inverse and matrix multiplication.</td>
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<td>2. Acquire problem-solving skills through computer programming.</td>
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<td>3. Plot various functions and parametric curves.</td>
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<td></td>
<td>4. Solve the differential equations for physics problems</td>
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<td>5. Gain the intellectual knowledge of complex functions and their applications.</td>
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<td>6. Apply the mathematical concepts to physics problems with the aid of computer programming</td>
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<td>7. Solve the geometry of the and plot variations of complex functions.</td>
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<td>7.</td>
<td>19PHU201</td>
<td>Electricity and Magnetism</td>
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<td></td>
<td>After successful completion of the course, the student is expected to</td>
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<td></td>
<td></td>
<td>1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.</td>
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<td>2. Gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.</td>
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<td></td>
<td>3. Use an understanding of calculus along with physical principles to effectively solve problems encountered in everyday life, further study in science, and in the professional world.</td>
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<td>4. Be able to use electromagnetic theory and principles in a wide range of applications.</td>
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<td>5. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.</td>
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<td></td>
<td>6. To develop an understanding of the principles of electricity and magnetism.</td>
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<td>8.</td>
<td>19PHU202</td>
<td>Analog Systems and Applications</td>
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<td>After successful completion of the course, the student is expected to</td>
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</table>
| 1. | To apply concepts for the design of Regulators and Amplifiers.  
2. | acquire knowledge about how a semiconductor diode rectifies an input ac signal  
3. | To verify the theoretical concepts through laboratory and simulation experiments.  
4. | Be able to know about the Field Effect Transistors, their principles and applications  
5. | Learn how to construct a transistor amplifier and how its gain varies with frequency  
6. | To implement mini projects based on concept of electronics circuit concepts.  
| 9. | 19PHU203 Mathematics - II | On successful completion of this course, the students will be able to  
   |   | 1. Appreciate the physical significance of Fourier series  
   |   | 2. Understand the mathematical principles on transforms and their application in physics.  
   |   | 3. Apply mathematical foundation to formulate and solve problems arising in physics  
   |   | 4. Synthesize numerical techniques for practical problems  
   |   | 5. Solve the numerical problem for physics  
   |   | 6. Apply the numerical methods to solve the real life problem  
| 10. | 19PHU211 Electricity and Magnetism Practical | After successful completion of the course, the student is expected to  
   |   | 1. To gain practical knowledge on RC Circuit  
   |   | 2. Develop skills in the basic concept of electric forces.  
   |   | 3. To understand Gauss law and its applications.  
   |   | 4. To gain practical knowledge on magnetic moment.  
   |   | 5. Determine a Low Resistance by Carey Foster’s Bridge  
   |   | 6. Compare capacitances using De’Sauty’s bridge  
| 11. | 19PHU212 Analog Systems and Applications Practical | After successful completion of the course, the student is expected to  
   |   | 1. Understand the basics of diode  
   |   | 2. Analyse the characteristics of Bipolar Junction Transistor  
   |   | 3. Perform the procedures for the working of RC-coupled transistor  
   |   | 4. Analyse the relationship between V-I & power curves  
   |   | 5. Understand the applications of Op-amp  
   |   | 6. Develop the ability to analyze and design analog electronic circuits using discrete components.  
   |   | 7. Acquire a basic knowledge in solid state electronics including diodes, MOSFET, BJT, and operational amplifier  
| 12. | 19PHU213 Mathematics Practical – II | On successful completion of this course, the student will be able to  
   |   | 1. Familiarize with the programming environment for numerical methods.  
   |   | 2. Develop proficiency in skills to solve the algebraic equations.  
   |   | 3. Evaluate the definite integrals using computer programming techniques  
<p>|   | 4. Find the solution through programming.  |</p>
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<td>13.</td>
<td>19AEC201</td>
<td>Environmental Studies</td>
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<td>After successful completion of the course, the student is expected to</td>
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<td></td>
<td>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</td>
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<td>2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.</td>
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<td>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</td>
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<td>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</td>
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<td>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</td>
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<td>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</td>
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<td>7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners.</td>
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<td>14.</td>
<td>19PHU301</td>
<td>Thermal Physics &amp; Statistical Mechanics</td>
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<td>After successful completion of the course, the student is expected to</td>
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<td></td>
<td>1. Identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions.</td>
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<td>2. Realize the importance of Thermo dynamical functions and their applications.</td>
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<td>3. Statistical physics methods, such as Boltzmann distribution, Gibbs distribution,</td>
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<td>4. Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems.</td>
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<td>5. Become familiar with various thermodynamic process and work done in each of this process.</td>
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<td>6. Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.</td>
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<td>7. Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.</td>
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<tr>
<td>15.</td>
<td>19PHU302</td>
<td>Physics of Electronic Devices and Circuits</td>
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<td>After successful completion of the course, the student is expected to</td>
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<td></td>
<td></td>
<td>1. Understand the construction and working of different semiconductor devices.</td>
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<td>2. Study about Basics electronics Technology</td>
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<tr>
<td>3.</td>
<td>Develop explicit problem-solving strategies that emphasize qualitative analysis steps to describe and clarify the problem.</td>
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<td>4.</td>
<td>Develop knowledge on design trade-offs in various digital electronic families with a view towards reduced power consumption.</td>
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<td>5.</td>
<td>Realize the importance of different electronic communication systems.</td>
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<tr>
<td>6.</td>
<td>Design power electronic circuit for real time application like rectifier and convertor etc.</td>
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<tr>
<th>16.</th>
<th>19PHU303A</th>
<th>Renewable Energy and Energy Harvesting</th>
</tr>
</thead>
<tbody>
<tr>
<td>After successful completion of the course, the student is expected to</td>
<td>1.</td>
<td>Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.</td>
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<tr>
<td>2.</td>
<td>Understand the concept of hydro energy resources and their classification.</td>
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<tr>
<td>3.</td>
<td>Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc.</td>
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<td>4.</td>
<td>Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.</td>
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<tr>
<td>5.</td>
<td>Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications.</td>
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<thead>
<tr>
<th>17.</th>
<th>19PHU303B</th>
<th>Physics Workshop Skill</th>
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<tbody>
<tr>
<td>After successful completion of the course, the student is expected to</td>
<td>1.</td>
<td>Acquire knowledge about various types of wiring systems, wiring tools, lighting &amp; wiring accessories, wiring estimation &amp; costing, etc.</td>
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<td>2.</td>
<td>To get familiarized with the welding process.</td>
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<tr>
<td>3.</td>
<td>Understand the concept of machining, forming and welding process.</td>
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<td>4.</td>
<td>Develop knowledge on Operation of oscilloscope.</td>
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<td>5.</td>
<td>Acquire knowledge about household electrical appliances, electric shock, etc.</td>
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<td>6.</td>
<td>To get familiarized with the properties of different materials- metals and non-metals</td>
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<thead>
<tr>
<th>18.</th>
<th>19PHU304</th>
<th>Chemistry – I</th>
</tr>
</thead>
<tbody>
<tr>
<td>After successful completion of the course, the student is expected to</td>
<td>1.</td>
<td>The molecular orbital theory, preparation and properties of inorganic compounds.</td>
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<tr>
<td>2.</td>
<td>Theory of covalent bond, polar effects and stereochemistry of organic compounds.</td>
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<tr>
<td>3.</td>
<td>About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.</td>
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<tr>
<td>4.</td>
<td>Elements of photochemistry, chemical kinetics and chromatography.</td>
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<td>5.</td>
<td>About the dyes, chemotherapy and vitamins.</td>
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<tr>
<td>19.</td>
<td>19PHU311</td>
<td>Thermal Physics and Statistical Mechanics Practical</td>
</tr>
<tr>
<td>20.</td>
<td>19PHU312</td>
<td>Physics of Electronic Devices And Circuits Practical</td>
</tr>
<tr>
<td>21.</td>
<td>19PHU313A</td>
<td>Renewable Energy and Energy Harvesting Practical</td>
</tr>
<tr>
<td>22.</td>
<td>19PHU313B</td>
<td>Physics Workshop Skill Practical</td>
</tr>
</tbody>
</table>
| 23. 19PHU314 | Chemistry Practical – I | 4. Operate the oscilloscope and PCB.  
5. Make different shape of materials using foundry tools.  
On successful completion of the course the students should have  
1. Learnt about the qualitative analysis of organic compounds.  
2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.  
3. Gain knowledge on basic test of organic compounds.  
4. Differentiate the chemicals and their families.  
5. Identify the compound whether it is aromatic or aliphatic.  
6. Confirm different functional group by confirmation studies. |
| 24. 19PHU401 | Wave and Optics | After successful completion of the course, the student is expected to  
1. To develop an understanding of the principles of optics.  
2. Understand linear, time-invariant systems.  
3. Understand the role of the wave equation and appreciate the universal nature of wave motion in a range of physical systems  
4. To build connections between mathematical development and conceptual understanding.  
5. Understand dispersion in waves and model dispersion using Fourier theory.  
6. Understand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model. |
| 25. 19PHU402 | Nuclear and Particle Physics | After successful completion of the course, the student is expected to  
1. Determine the charge, mass of any nucleus by using various spectrograph.  
2. They are able to understand the size of nucleus and all its properties.  
3. Develop and communicate analytical skills in subatomic physics.  
4. This course has led the students to understand interaction of various types of radiation with matter which they observe in their daily life. It’s easy for them now to relate the theory to practical.  
5. Acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly used in this area.  
6. Students now know various methods of accelerating various types of particles to perform scattering experiments. |
| 26. 19PHU403A | Basic Instrumentation Skill | After successful completion of the course, the student is expected to  
1. Develop skills to impart practical knowledge in real time solutions. |
<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>After successful completion of the course, the student is expected to</th>
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<tbody>
<tr>
<td>27. 19PHU403B</td>
<td>Radiation Safety</td>
<td>2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.</td>
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<td></td>
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<td>3. Understand the terminology used in various instruments.</td>
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<td>4. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.</td>
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<td>5. Connect concepts with the instruments to enhance understanding.</td>
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<td>6. Understand measurement technology, usage of new instruments and real time applications in engineering studies.</td>
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<td>28. 19PHU404</td>
<td>Chemistry – II</td>
<td>1. List and describe the function the parts of the x-ray machine.</td>
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<td></td>
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<td>2. Describe the spectrum of electromagnetic radiation.</td>
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<td>3. Understand the terminology used in radiation safety.</td>
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<td>4. Gain knowledge of new concept in the field of radiation.</td>
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<td>5. They are able to understand the Interaction of Radiation with matter.</td>
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<td>6. Impact knowledge on different radiation detector.</td>
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<td>29. 19PHU411</td>
<td>Wave and Optics Practical</td>
<td>1. Gain knowledge on various theories of light.</td>
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<td>2. Acquire skills to identify and apply formulas of optics and wave physics.</td>
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<td>3. Understand the properties of light like reflection, refraction, interference, and diffraction etc..</td>
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<td>4. Understand the applications of diffraction and polarization.</td>
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<td>5. Determine the different optical properties by using various apparatus.</td>
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<td>6. Know the importance of optical materials in the industrials.</td>
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<tr>
<td>30. 19PHU412</td>
<td>Nuclear and Particle Physics Practical</td>
<td>After successful completion of the course, the student is expected to</td>
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<td>No.</td>
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<td>Course Title</td>
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</table>
| 31  | 19PHU413A   | Basic Instrumentation Skill Practical  | After successful completion of the course, the student is expected to       | 1. Handle any kind of process by framing it in block diagram, mathematical model and different process variables.  
2. Use modern engineering tools and techniques in the practice of electronic devices.  
3. Know all the industrial processes and demonstrate their knowledge in designing the control loops for these processes.  
4. Understand the working of various types of amplifiers, oscillators, wave shaping and power supply circuits  
5. Design and Analyze the various types of amplifiers, oscillators, wave shaping and power supply circuits for any practical situation.  
6. Discuss the terms, principle, instrumentation, operation and applications of instruments. |
| 32  | 19PHU413B   | Radiation Safety Practical            | After successful completion of the course, the student is expected to       | 1. Understood the concepts of nuclear radiation.  
2. Know the interaction of nuclear radiation with matter.  
3. Detect the nuclear radiation.  
4. Be familiar with dosimeters and measurements.  
5. Know the importance of background radiation levels using Radiation meter.  
6. Identify the α particles using reference source & determining its half-life using spark counter. |
| 33  | 19PHU414    | Chemistry Practical– II               | After successful completion of the course, the student is expected to       | 1. Learnt about the qualitative analysis of organic compounds.  
2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.  
3. Gain knowledge on basic test of organic compounds.  
4. Differentiate the chemicals and their families.  
5. Estimate the Acidimetry & Alkalimetry by volumetric analysis  
6. Experience the practical knowledge of Acidimetry & Alkalimetry, Permanganometry |
| 34  | 19PHU501    | Mathematical Physics - I              | After successful completion of the course, the student is expected to       | 1. To communicate mathematical and physical knowledge and ideas to the students.  
2. Get introduced to Special functions like Gamma function, Beta function, Delta function, Bessel functions and their recurrence relations |
3. Learn the fundamentals and applications of Complex Variable, Analyticity, Cauchy-Riemann and Cauchy’s Integral.
4. Build connections between mathematical development and conceptual understanding.
5. Understand the relationship between observation and theory and their use in building the basic concepts of computing.
6. To contribute innovations and application of basic research.

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<tr>
<th>35.</th>
<th>19PHU502</th>
<th>Electromagnetic Wave Propagation</th>
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<td>After successful completion of the course, the student is expected to</td>
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<td></td>
<td>1. Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.</td>
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<td>2. Be able to use electromagnetic wave theory and principles in a wide range of applications.</td>
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<td>3. Gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.</td>
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<td>4. Solve simple electrostatic boundary problems.</td>
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<td>5. Describe simple models for electromagnetic interaction with media</td>
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<td>6. Be able to choose adequate models and solution methods for specific problems.</td>
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<th>36.</th>
<th>19PHU503A</th>
<th>Elements of Modern Physics</th>
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<td>After successful completion of the course, the student is expected to</td>
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<td>1. recall and apply knowledge in the areas of optics and waves, special relativity and</td>
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<td>2. quantum physics (developing the knowledge capability dimension); analyze and solve problems in these areas (developing the critical analysis and problem-solving capability dimension);</td>
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<td>3. Understand the relationship between observation and theory and their use in building the basic concepts of modern physics.</td>
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<td>4. Understand how major concepts developed and changed over time.</td>
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<td>5. Capable of analyzing and solving problems using oral and written reasoning skills based on the concepts of modern physics.</td>
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<td>6. Conduct relevant experiments, analyze data and report results in written form (developing the technical capability and communication dimensions).</td>
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<th>37.</th>
<th>19PHU503B</th>
<th>Medical Physics</th>
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<td>After successful completion of the course, the student is expected to</td>
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<td>1. Define medical imaging techniques specified in the syllabus below and know where they are applied in clinical practice.</td>
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<td>2. Apply a knowledge of x-ray systems and physics to analyze and compare the performance of different medical x-ray imaging systems.</td>
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<td>3. Describe (and create) target and region at risk planning volumes.</td>
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<td>4. Describe the capabilities of the Clinical Trials Processing application.</td>
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<td>Course Title</td>
<td>Prerequisite</td>
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<td>5.</td>
<td>Understand the biological consequences of radiation damage.</td>
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<td>6.</td>
<td>Describe how ionizing radiation interacts with matter, how it affects living organisms and how it is used as a therapeutic technique.</td>
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| 38. 19PHU504A | Computational Skill | After successful completion of the course, the student is expected to  
1. Demonstrate basic knowledge of numerical methods.  
2. Demonstrate basic programming skills.  
3. Demonstrate an understanding of the applicability of numerical methods for modeling.  
4. Physical systems and its advantages and disadvantages.  
5. Demonstrate the ability to estimate the errors in the use of numerical methods.  
6. Demonstrate skills to write and develop simple programs in FORTRAN.  
7. Understand the Importance of graphical analysis and its limitations. |  |
| 39. 19PHU504B | Weather Forecasting | After successful completion of the course, the student is expected to  
1. Ecosystems and climate interactions.  
2. Effects of climate change on life cycles.  
4. The greenhouse effect, Treaty rights.  
5. Traditional ecological knowledge.  
6. Understand the climate change and related issues. |  |
| 40. 19PHU511 | Mathematical Physics - I Practical | After successful completion of the course, the student is expected to  
1. To communicate mathematical and physical knowledge and ideas to the students.  
2. To demonstrate the utility and limitations of a variety of powerful calculational techniques and to provide a deeper understanding of the mathematics underpinning theoretical physics.  
3. Evaluate the definite integrals using computer programming techniques.  
4. Find the solution through programming languages.  
5. Write the coding for physical problems.  
6. Solve complex problems through modeling. |  |
| 41. 19PHU512 | Electromagnetic Wave Propagation Practical | After successful completion of the course, the student is expected to  
1. find electric and magnetic fields from stationary and dynamic charge and current distributions.  
2. describe simple models for electromagnetic interaction with media.  
3. be able to choose adequate models and solution methods for specific problems.  
4. Operate the polarimeter to find the polarization behavior of liquid and crystalline materials.  
5. Calculate the wavelength of monochromatic source Young’s double slit method.  
6. Verify the Faraday’s law of electromagnetism. |  |
| 42. 19PHU513A | Elements of Modern Physics Practical | After successful completion of the course, the student is expected to  
1. Recall and apply knowledge in the areas of optics and waves, special relativity and quantum physics (developing the knowledge capability dimension);  
2. Conduct relevant experiments, analyse data and report results in written form (developing the technical capability and communication dimensions).  
3. Analyse the plank’s constant using different experimental technique.  
4. Find the wavelength of any laser sources.  
5. Differentiate the interference and diffraction properties by the experiments.  
6. Understand the theory and practical knowledge of light and other properties. |
| --- | --- | --- |
| 43. 19PHU513B | Medical Physics Practical | After successful completion of the course, the student is expected to  
1. Different areas of research in Medical Physics  
2. Understand and apply key concepts specific to energy deposition for both ionizing photon interactions and transport in matter  
3. Know the energetic charged particle interactions and transport in matter.  
4. Understanding the working of a manual optical eye-testing machine  
5. Familiarization with the Use of a Vascular Doppler.  
6. Realize the real time examples of medical instruments. |
| 44. 19PHU514A | Computational Skill Practical | After successful completion of the course, the student is expected to  
1. Demonstrate basic knowledge of numerical methods.  
2. Demonstrate basic programming skills.  
3. demonstrate an understanding of the applicability of numerical methods for modeling Physical systems and its advantages and disadvantages.  
4. Solve the problems by computing.  
5. Understand the differences of theory, computing and experiments.  
6. Solve the complex equations using different software packages. |
| 45. 19PHU514B | Weather Forecasting Practical | After successful completion of the course, the student is expected to  
1. Know the idea on Ecosystems and climate interactions  
2. Know the Effects of climate change on life cycles  
3. Know the Biodiversity, Weather vs climate  
4. Understand the greenhouse effect, Treaty rights  
5. understand traditional ecological knowledge  
6. understand the importance of weather changes. |
| 46. 19PHU601 | Mathematical Physics -II | After successful completion of the course, the student is expected to  
1. To know elementary ideas in linear algebra, special functions and complex analysis.  
2. Learn different ways of solving second order differential equations |
<table>
<thead>
<tr>
<th></th>
<th>19PHU602</th>
<th>Solid State Physics</th>
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</thead>
<tbody>
<tr>
<td>3.</td>
<td>Learn the fundamentals and applications of Fourier series, Fourier and Laplace transforms, their inverse transforms etc.,</td>
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<tr>
<td>4.</td>
<td>Students can be able to apply these concepts to solve problems in classical, statistical and quantum mechanics as well as electromagnetism.</td>
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<tr>
<td>5.</td>
<td>Learn about special type of matrices that are relevant in physics and then learn about tensors.</td>
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<tr>
<td>6.</td>
<td>Learn different ways of solving group theory equations</td>
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<thead>
<tr>
<th></th>
<th>After successful completion of the course, the student is expected to</th>
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<tbody>
<tr>
<td>1.</td>
<td>be able to account for interatomic forces and bonds.</td>
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<tr>
<td>2.</td>
<td>have a basic knowledge of crystal systems and spatial symmetries.</td>
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<tr>
<td>3.</td>
<td>be able to account for how crystalline materials are studied using diffraction, including concepts like form factor, structure factor, and scattering amplitude.</td>
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<tr>
<td>4.</td>
<td>know what phonons are, and be able to perform estimates of their dispersive and thermal properties.</td>
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<tr>
<td>5.</td>
<td>be able to calculate thermal and electrical properties in the free-electron model.</td>
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<tr>
<td>6.</td>
<td>be able to explain superconductivity using BCS theory</td>
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<tr>
<td>7.</td>
<td>be able to outline the importance of solid-state physics in the modern society.</td>
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</tbody>
</table>

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<tr>
<th></th>
<th>19PHU603A</th>
<th>Nano Materials and Applications</th>
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</thead>
<tbody>
<tr>
<td>48.</td>
<td>After successful completion of the course, the student is expected to</td>
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<tr>
<td>1.</td>
<td>Explain the fundamental principles of nanotechnology and their application to biomedical engineering.</td>
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<tr>
<td>2.</td>
<td>Apply engineering and physics concepts to the nano-scale and non-continuum domain.</td>
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<tr>
<td>3.</td>
<td>Identify and compare state-of-the-art nanofabrication methods</td>
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<tr>
<td>4.</td>
<td>Perform a critical analysis of the research literature.</td>
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<tr>
<td>5.</td>
<td>Design processing conditions to engineer functional nanomaterials.</td>
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<tr>
<td>6.</td>
<td>Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.</td>
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<thead>
<tr>
<th></th>
<th>19PHU603B</th>
<th>Biological Physics</th>
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<tbody>
<tr>
<td>49.</td>
<td>After successful completion of the course, the student is expected to</td>
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<tr>
<td>1.</td>
<td>Demonstrate knowledge of the fundamental concepts in physics and chemistry that underlie biological processes.</td>
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<tr>
<td>2.</td>
<td>Define the structural characteristics of nucleic acids and proteins</td>
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<tr>
<td>3.</td>
<td>examine parameters that variously determine their stability and function(s).</td>
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<tr>
<td>4.</td>
<td>Describe the principles that govern biomolecular interactions</td>
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<td>5.</td>
<td>appreciate how established methods of research and enquiry are employed to analyze the different aspects of these interactions.</td>
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<tr>
<td>6.</td>
<td>Understand the concept of life of molecules.</td>
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</tbody>
</table>
| 50. | 19PHU611 | Mathematical Physics Practical – II | After successful completion of the course, the student is expected to  
1. Communicate mathematical and physical knowledge and ideas to the students.  
2. demonstrate the utility and limitations of a variety of powerful calculation techniques  
3. provide a deeper understanding of the mathematics underpinning theoretical physics.  
4. Write algorithm of numerical problems.  
5. Analytical thinking and correlation of the problems.  
6. Understand the interpretation of physical problems. |
| 51. | 19PHU612 | Solid State Physics Practical | After successful completion of the course, the student is expected to  
1. Basic practical knowledge on magnetic materials.  
2. Understand the basic idea about the dielectric Properties of Solids  
3. Experience the behavior of Hysteresis loop of a crystal.  
4. Measure the susceptibility of magnetic materials.  
5. Verify the dielectric constant of a materials by experimentally.  
6. Understand the importance of new materials in modern technology. |
| 52. | 19PHU613A | Nano Materials and Applications Practical | After successful completion of the course, the student is expected to  
1. Understand the methods synthesis of nanomaterials  
2. Understand their application and the impact of nanomaterials on environment  
3. Apply their learned knowledge to develop Nanomaterials.  
4. Bring new materials to the society.  
5. Gain knowledge on different spectroscopic techniques.  
6. Apply their learned knowledge to develop the new devices. |
| 53. | 19PHU613B | Biological Physics Practical | After successful completion of the course, the student is expected to  
1. Students will function successfully in the laboratory and use safe laboratory practices.  
2. Students will critically evaluate data and design experiments to test hypotheses relevant to the practice of Biochemistry and Biophysics.  
3. Students will demonstrate awareness of ethical issues in the practice of science.  
4. Know the operation of medical instruments.  
5. Apply their knowledge to develop the instruments.  
6. Verify the basic principles and laws experimentally. |
| 54. | 19PHU691 | Project | After successful completion of the course, the student is expected to  
1. Demonstrate a depth of knowledge of Physics.  
2. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.  
3. To apply his/her knowledge and skills to carry out advanced tasks and projects.  
4. Apply their knowledge to develop the instruments. |
|   |   | 5. Verify the basic principles and laws experimentally as a project.  
6. Demonstrate knowledge of contemporary issues in their chosen field of research.  
7. Demonstrate an ability to present and defend their research work. |
### Course Outcomes

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>19PHP101</td>
<td>Condensed Matter Physics</td>
<td>After completing the course students will/can able to 1. Analyze the electronic, magnetic and thermal properties of materials. 2. Classify condensed matter upon its degree of order, with emphasis on scattering experiments. 3. Differentiate materials in a variety of applications. 4. Explain various types of magnetic phenomenon, physics behind them, their properties and applications. 5. Explain superconductivity, its properties, important parameters related to possible applications. 6. Develop the superconducting materials and understand the materials property the basic concept of superconductor.</td>
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<tr>
<td>2.</td>
<td>19PHP102</td>
<td>Electronic Devices and Circuits</td>
<td>After completing the course students will/can able to 1. Build, design and analyze analog to digital converter. 2. Design digital and analog systems. 3. Understand the basic operation and working of different diodes like FET, MOSFET, CMOS, etc. 4. Understand the high frequency application of diodes. 5. Analyze PN junctions in semiconductor devices under various conditions. 6. Design and analyze simple rectifiers and voltage regulators using diodes.</td>
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<tr>
<td>3.</td>
<td>19PHP103</td>
<td>Classical Mechanics and Relativity</td>
<td>After completing the course, the students will/ can able to 1. Understand the classical laws of motion. 2. Compete in using the essential mathematical skills needed for describing mechanics and special relativity. 3. Develop problem solving skills. 4. An appreciation of the influence of classical mechanics and relativity on modern scientific development. 5. Use the statistical physics methods, such as Boltzmann distribution, Fermi-Dirac and Bose-Einstein distributions to solve problems in physical systems.</td>
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<tr>
<td>4.</td>
<td>19PHP104</td>
<td>Mathematical Physics</td>
<td>After completing the course, the students will / can able to 1. Apply integral transform (Fourier and Laplace) to solve mathematical problems of Fourier transforms as an aid for analyzing experimental data. 2. Students can formulate and express a physical law in terms of tensors, and simplify it by use the</td>
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<td>5.</td>
<td>19PHP105A</td>
<td><strong>Material Characterization</strong></td>
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<td>After completing the course, the students will / can able to</td>
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<td>1. Handle with X-ray, thermal, microscopic, and electrical methods of characterization.</td>
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<td>2. Understand and describe the fundamental principles behind the methods of characterization which are included in the curriculum</td>
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<td>3. Analyze, interpret and present observations from the different methods.</td>
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<td>4. Evaluate the uncertainty of observations and results from the different methods.</td>
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<td>5. Understand the history of materials science with basic understanding of metals, binary alloys, magnetic materials, dielectric materials and polymers</td>
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<td>6. Understand nucleation, growth and phase transformation kinetics</td>
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<td>6.</td>
<td>19PHP105B</td>
<td><strong>Astronomy and Astrophysics</strong></td>
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<td>After completing the course, the students will / can able to</td>
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<td>1. Plan and engage in an independent and sustained critical investigation of a chosen research topic to generate new knowledge in an area of astronomy and astrophysics.</td>
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<td>2. Systematically evaluate relevant theory and concepts in astronomy and astrophysics,</td>
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<td>3. Relate these to appropriate methodologies and evidence and draw appropriate conclusions.</td>
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<td>4. Demonstrate capacity for astronomy and astrophysics reasoning through analyzing, proving and explaining concepts from the chosen research area.</td>
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<td>5. Identify important constellations – orient in space.</td>
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<td>6. Describe the planets of the solar system and their properties.</td>
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<td>7.</td>
<td>19PHP105C</td>
<td><strong>Crystal Growth Techniques</strong></td>
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<td>After completing the course, the students will / can able to</td>
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<td>1. The student will learn about the crystal growth mechanisms and techniques.</td>
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<td>2. Understand different crystals having a lot applications in electronics, energetics etc.</td>
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<td>3. Acquire the theoretical concept behind electrical and thermal properties of metals</td>
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<td>4. Understand the fundamental theories to describe the energy bands in metals</td>
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</tbody>
</table>
|   | 19PHP111 General Physics Practical - I | 8. After completing the practical course students will/can able to  
   |   |   | 1. Apply the analytical techniques and graphical analysis to the experimental data.  
|   |   | 2. Verify laws studied in the different theory course.  
|   |   | 3. Measure different properties of materials.  
|   |   | 4. classify the materials with the properties  
|   |   | 5. overcome the fear of experimental skill  
|   |   | 6. Capable to build his own equipments for measuring the properties of materials  
| 9. | 19PHP112 Electronics Practical – I | 9. After completing the practical course students will/can able to  
   |   |   | 1. Design and handle various instruments.  
|   |   | 2. Verify laws studied in the different theory course.  
|   |   | 3. Measure different properties of materials.  
|   |   | 4. Gain the knowledge in quantization of electromagnetic fields.  
|   |   | 5. Analyze the characteristics of oscillators and wave shaping circuits  
|   |   | 6. Understand the basic concepts of amplifiers and operational amplifier  
| 10. | 19PHP201 Thermodynamics And Statistical Mechanics | 10. After completing the course students will/can able to  
   |   |   | 1. Understand the classical laws of motion.  
|   |   | 2. Compete in using the essential mathematical skills needed for describing mechanics and special relativity  
|   |   | 3. Understand of significance of conservation of various physical quantities to discuss the motion of dynamical system.  
|   |   | 4. Understand of constraints and their significance to solve the equations of motion of the dynamical system.  
|   |   | 5. Understand of necessity of Lagrangian and Hamiltonian formulations for simplified treatments of many complex problems in classical mechanics.  
|   |   | 6. Develop problem solving skills in nonlinear dynamics.  
| 11. | 19PHP202 Quantum Mechanics - I | 11. After completing the course, the students can/will able to  
   |   |   | 1. Interpret the wave function and apply operators to it, to obtain information about a particle's physical properties such as position, momentum and energy  
|   |   | 2. To solve the Schrodinger equation to obtain wave functions for some basic, physically important types of potential in one dimension, and estimate the shape of the wavefunction based on the shape of the potential  
|   |   | 3. Understand the role of uncertainty in quantum physics, and use the commutation relations of operators to determine whether or not two physical properties can be simultaneously measured.  

4. They will be able to apply the technique of separation of variables to solve problems in more than one dimension and to understand the role of degeneracy in the occurrence of electron shell structure in atoms.
5. Apply special functions as the solutions of differential equation as the wave function/state functions and understanding the physical situations where these can be applied.
6. Calculating states of electrons in hydrogen atom and harmonic oscillators and the interpretation of quantum states

| 12. | 19PHP203 Nuclear Physics | After completing the course, the students will / can able to |
|     |                         | 1. Explain central concepts, laws and models in nuclear and particle physics. |
|     |                         | 2. Interpret basic experiments using basic laws and relations to solve simple problems. |
|     |                         | 3. Students understand the basic principle, type of accelerators, working and operation of accelerators. |
|     |                         | 4. Learn the basic of ion sources, beam transport and application of accelerator in different branches of science. |
|     |                         | 5. Get trained in research institute and academic Universities to handle such complicated machine such as reactors. |
|     |                         | 6. Explore their knowledge in reactors to the atomic agency |

| 13. | 19PHP204 SPECTROSCOPY | After completing the course, the students will / can able to |
|     |                       | 1. Understand the basic physical chemistry law that govern molecular spectroscopy |
|     |                       | 2. Student will know basic information on molecular methods (IR, Raman, UV-VIS, NMR, EPR) |
|     |                       | 3. Select molecular spectroscopy methods suitable for solving given scientific problem |
|     |                       | 4. Analyze results of measurements using molecular spectroscopy |
|     |                       | 5. Give a view of the modern experimental tools of Atomic- and Molecular Physics. |
|     |                       | 6. Gain knowledge of the most common atomic and molecular spectroscopic methods and the atomic and molecular properties derived from those. |

| 14. | 19PHP205A Digital Signal Processing | After completing the course, the students will/able to |
|     |                                      | 1. Determine the spectral coefficients and the Fourier series components of discrete-time signals. |
|     |                                      | 2. Determine the frequency response and the z-transform of discrete-time systems. |
|     |                                      | 3. Determine the discrete Fourier transform of discrete-time signals. |
|     |                                      | 4. Calculate the outputs of discrete-time systems in response to inputs. |
|     |                                      | 5. Understand the characteristics field effect transistors |
|     |                                      | 6. Analyze the characteristics of oscillators and wave shaping circuits |
| 15 | 19PHP205B | Computational Physics | After completing the course, the students will/able to  
1. Programme numerical methods and their implementation like applying to problem in physics, including modeling of classical physics to quantum system as well as data analysis (Linear and nonlinear).  
2. Analysis techniques for propagating error, representing data graphically. Create, solve and interpret basic mathematical tool.  
3. Program independently computers using leading-edge tools,  
4. formulate and computationally solve a selection of problems in physics,  
5. Use the tools, methodologies, language and conventions of physics to test and Communicate ideas and explanations.  
6. Identify and describe the characteristics of various numerical methods |
|---|---|---|---|
| 16. | 19PHP205C | Thin Film Physics | At the end of the course, the students can/will be able to  
1. Discuss the Differences and Similarities Between Different Vacuum Based Deposition Techniques  
2. Evaluate and Use Models for Nucleating and Growth of Thin Films  
3. Examine the Relation Between Deposition Technique, Film Structure, And Film Properties,  
4. Discuss Typical Thin Film Applications,  
5. Select Proper Deposition Techniques for Various Applications.  
6. Understand the Basic Concepts About the Thin Film Technology  
7. The Importance of Use of Thin Films in Application and Research. |
| 17. | 19PHP211 | General Physics Practical – II | After the course the student will/ can able to  
1. Handle various difficult instruments.  
2. Verify laws studied in the different theory course.  
3. Measure different properties of materials.  
4. Classify the materials with the properties  
5. Overcome the fear of experimental skill  
6. Built his own equipments for measuring the properties of materials |
| 18. | 19PHP212 | Electronics Practical – II | After completing the practical course, the students can / will able to  
1. Apply the analytical techniques and graphical analysis to the experimental data.  
2. Verify laws studied in the different theory course.  
3. Measure different properties of materials.  
4. Gain the knowledge in quantization of electromagnetic fields.  
5. Analyze the characteristics of oscillators and wave shaping circuits  
6. Understand the basic concepts of amplifiers and operational amplifiers |
| 19. | 19PHP301 | Quantum Mechanics – II | After completing the course, the student will/can able to  
1. Get the knowledge of non-relativistic and relativistic quantum mechanics including Time dependent
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 20. 19PHP302 | Laser and its Applications | 1. Acquire fundamentals and principles of Laser action and Understand the basic concepts of different types of lasers  
2. Understand the absorption and spontaneous and stimulated emission in two level system,  
3. The effects of homogeneous and inhomogeneous line broadening, and the conditions for laser amplification.  
4. Operate and analyze the properties of the most common laser types, He-Ne, Argon-ion, and carbon-dioxide, ruby, titanium sapphire, neodymium YAG and glass, knowledge of other main laser types.  
5. Classify fibers as single-mode, multimode step index and multi-mode graded index.  
6. Describe modes in multimode fibers and mode field parameter in single-mode fibers |
| 21. 19PHP303 | Electromagnetic Theory and Electrodynamics | 1. Formulate potential problems within electrostatics, magnetostatics and stationary current distributions in linear, isotropic media, and also solve such problems in simple geometries using separation of variables and the method of images.  
2. Define and derive expressions for the energy both for the electrostatic and magnetostatic fields, and derive Poyntings theorem from Maxwells equations and interpret the terms in the theorem physically.  
3. Understand the theories and properties of electrostatics  
4. Analyze the interaction of electrostatic properties with matter.  
5. Acquire the fundamental knowledge in Magnetostatics  
6. Understand the basic concepts of electrodynamics |
<p>| 22. 19PHP304 | Digital Electronics and Microprocessor | 1. Acquire the basic knowledge of digital logic levels and application of digital electronics circuits. |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Learning Outcomes</th>
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</thead>
<tbody>
<tr>
<td>23. 19PHP305A</td>
<td>Nanostructures and Characterization</td>
<td>At the end of the course, Students will understand and: 1. Explain the fundamental principles of nanotechnology and their application to biomedical engineering. 2. Apply engineering and physics concepts to the nano-scale and non-continuum domain. 3. Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature. 4. Design processing conditions to engineer functional nanomaterials. 5. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems. 6. Get motivated to select the deposition techniques for various applications</td>
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<tr>
<td>24. 19PHP305B</td>
<td>Solar Energy and Its Utilization</td>
<td>At the end of the course, Students will / can be able to 1. Impart the knowledge of Storage technologies form the autonomous renewable energy sources. 2. Explain the principles that underlie the ability of various natural phenomena to deliver solar energy. 3. Discuss the positive and negative aspects of solar energy in relation to natural and human aspects of the environment. 4. Understand the basic principles in wind energy conversion and advantage and disadvantage of wind energy conversion systems. 5. Gain the knowledge about the energy produced from biomass and biogas. 6. Understand the concepts of solar cell and solar energy</td>
</tr>
<tr>
<td>25. 19PHP305C</td>
<td>Optoelectronics</td>
<td>At the end of the course, Students will / can be able to 1. Conversant with the application of optical properties and processes in semiconductor optical sources. 2. Understand the operation of LEDs and lasers. 3. Be familiar with the structures and performance of LEDs and lasers. 4. Apply the knowledge of laser in holography 5. Gain the knowledge in Fourier optics and Fourier transforming properties of lenses 6. Understand the concepts of nonlinear optics and harmonic generations.</td>
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<td>Code</td>
<td>Course Name</td>
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<tr>
<td>26.</td>
<td>19PHP311</td>
<td>Advanced Physics Practical</td>
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<tr>
<td>27.</td>
<td>19PHP312</td>
<td>Advanced Electronics Practical</td>
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<tr>
<td>28.</td>
<td>19PHP491</td>
<td>Project</td>
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FACULTY OF ENGINEERING

Name of the Department: **Automobile Engineering**

Course: B.E.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1       | 18BEAE301   | Mathematics - III (PDE, Probability and Statistics) | 1. Apply the fundamental concepts of partial differential equations and the various solution procedures for solving the first order non-linear partial differential equations.  
2. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.  
3. Apply the basic concepts of probability and standard distribution.  
4. Analyze the basic concepts of one and two-dimensional random variables and apply in engineering applications.  
5. Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.  
6. Summarize the concept of testing of hypothesis for small and large samples in real-life problems. |
| 2       | 18BEAE302   | Engineering Mechanics | 1. Determine the resultant force and moment for a given system of forces.  
2. Analyse the plane trusses having different types of supports and determine the forces in each member.  
3. Identify the location of centroid, centre of gravity and calculate the moment of inertia for different sections.  
4. Apply the equations of motion of particles to calculate displacement, velocity and acceleration.  
5. calculate dynamic forces exerted in rigid body  
6. Determine the friction and its effects by using the laws of friction. |
| 3       | 18BEAE303   | Applied Thermodynamics | 1. Apply the first law of thermodynamics to closed and open systems.  
2. Solve the problems related to cycles and cyclic devices using the second law of thermodynamics.  
3. Determine the thermodynamic properties of pure substances and its phase change processes.  
4. Evaluate the air standard performance of heat engines.  
5. Solve the psychrometric problems in various applications.  
6. Calculate the performance of air compressors and refrigeration systems. |
| 4 | 18BEAE304 | Automotive Engines | 1. Differentiate the construction and operation of two-stroke and four-stroke engines.  
2. Name and explain various components of the fuel feed system.  
3. Discuss the combustion process and combustion chambers.  
4. List and describe the different methods of supercharging and turbocharging.  
5. Explain the importance of cooling system.  
6. Explain the importance of lubrication system. |
|---|---|---|---|
| 5 | 18BEAE305 | Engineering Metrology And Measurements | 1. Explain the basic concept of measurement and characteristics of measuring instruments.  
2. Practice the appropriate linear and angular dimensions using precision measuring instruments.  
3. Examine the major terminologies for the gear and screw thread measurement.  
4. Explain the suitable type of instrument used to measure the mechanical parameters.  
5. Apply the advanced techniques in metrology to calculate the geometric dimensions.  
6. Practice the digital devices and computer aided inspection devices. |
| 6 | 18BEAE306 | Biology For Engineers | 1. Summarise the cell structures and their functions.  
2. Explain the biomolecules functions.  
3. Classify the communicable and non-communicable human diseases.  
4. Illustrate the different organ function tests.  
5. Tell the applications of biology in environmental applications.  
6. Describe the concept of biomechanics. |
| 7 | 18BEAE311 | Automotive Engine Components And Measurements Laboratory | 1. Identify and assemble the components of an engine.  
2. Explain the function of various components of an engine.  
3. Practice the appropriate linear and angular dimensions using precision measuring instruments.  
4. Examine the major terminologies for the gear and screw thread.  
5. Explain the suitable type of instrument used to measure the mechanical parameters.  
6. Understand the calibration of Vernier / micrometer / dial gauge. |
| 8 | 18BEAE312 | Computer Aided Machine Drawing Laboratory | 1. Sketch the detailed drawing of sleeve and cotter joint.  
2. Sketch the detailed drawing of knuckle joint  
3. Sketch the detailed drawing of gib and cotter joint.  
4. Sketch the detailed drawing of universal coupling.  
5. Sketch the detailed drawing of screw jack.  
6. Create the assembly drawing of piston and connecting rod. |
| 9 | 18BEAE313 | Thermal Engineering Laboratory | 1. Measure the flash point, fire point and viscosity of given sample.  
2. Draw the port timing diagram of two-stroke and valve timing diagram of four-stroke internal combustion engines.  
3. Evaluate the performance of internal combustion engine and reciprocating air compressor.  
4. Calculate the coefficient of performance of a refrigeration system.  
5. Estimate the thermal conductivity of material, heat transfer from surface and emissivity of a grey surface.  
6. Calculate the effectiveness of a heat exchanger. |
|---|---|---|---|
| 10 | 18BEAE351 | Soft Skills | 1. Demonstrate the adequate soft skills required for the workplace.  
2. Express the presentation skills  
3. Express the views in group discussions with confidence.  
4. Demonstrate the appropriate interview skills.  
5. Manage time effectively.  
6. Explain the stress management. |
| 11 | 18BEAE401 | Fluid Mechanics And Heat Transfer | 1. Estimate the flow properties and pressure head using fundamental laws of fluid mechanics.  
2. Evaluate the discharge and loss of energy in flow through pipes.  
3. Analyse the performance of hydraulic pumps and turbines for a given application.  
4. Apply the heat conduction equation to compute the rate of heat transfer in simple and composite systems.  
5. Determine the rate of heat transfer in convection mode.  
6. Determine the rate of heat transfer in radiation mode. |
| 12 | 18BEAE402 | Strength Of Materials | 1. Evaluate the stresses and strains in simple and composite structures subjected to axial loads.  
2. Examine the shear force, bending moment and shear stress of various beams under different loading conditions.  
3. Examine the stresses induced in the shaft and closed coil helical springs subjected to torsion.  
4. Evaluate the slope and deflection of beams and buckling loads of columns with different boundary conditions.  
5. Examine the stresses in two-dimensional systems and thin cylinders.  
6. Familiar with construction of Mohr’s circle. |
| 13 | 18BEAE403 | Theory Of Machines | 1. Identify the simple mechanisms based on a given application, and find velocity and acceleration of simple mechanisms.  
2. Estimate the amount of power transmitted by drive. |
### 3. Calculate the speed ratio of various types of the gear train and construct the cam profile for the various types of follower motion.
4. Estimate the balancing mass for rotating and reciprocating masses by using the force and couple polygon.
5. Evaluate the natural frequency of a single degrees of freedom system subjected to free and forced vibrations.
6. Compute the torsional vibration of shaft.

<table>
<thead>
<tr>
<th>14</th>
<th>18BEAE404</th>
<th>Engineering Materials And Metallurgy</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1. Explain the phase diagrams of different engineering materials.</td>
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<td>2. Recognise the properties and applications of various metals and alloys.</td>
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<td>3. Identify the appropriate heat treatment processes for the given applications.</td>
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<td>4. Test the mechanical properties of the given materials for real-time applications.</td>
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<td>5. Understand the fundamentals of composites</td>
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<td>6. Identify the appropriate composites for applications in the automotive industry.</td>
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<tr>
<th>15</th>
<th>18BEAE441</th>
<th>Automotive Chassis And Transmission</th>
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<tbody>
<tr>
<td></td>
<td>1. Discuss the types of frame, front axle and steering system.</td>
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<td>2. Sketch and explain the different types of clutches and gearboxes.</td>
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<td>3. Describe the components in driveline, final drive and rear axle.</td>
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<td>4. Describe the suspension systems and wheels.</td>
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<td>5. Familiar with tyres – tyre construction – tyre designation</td>
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<td>6. Explain the construction and working principle of different types of brakes.</td>
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<tr>
<th>16</th>
<th>18BEAE442</th>
<th>Automotive Electrical And Electronics Systems</th>
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<tbody>
<tr>
<td></td>
<td>1. Sketch and explain the working principle of battery and ignition system.</td>
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<td>2. Discuss working of the starting system and charging system.</td>
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<td>3. Illustrate the automobile wiring system.</td>
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<td>4. Illustrate the automobile lighting system.</td>
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<td>5. Identify the sensors and actuators used in the automobile.</td>
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<td>6. Explain the electronic engine management system.</td>
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<tr>
<th>17</th>
<th>18BEAE411</th>
<th>Fluid Mechanics And Strength Of Materials Laboratory</th>
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<tr>
<td></td>
<td>1. Calculate the rate of fluid flow and coefficient of discharge in fluid flow devices.</td>
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<td>2. Measure the losses associated in a pipe flow.</td>
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<td>3. Evaluate the performance of non-positive and positive displacement pumps.</td>
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<td>4. Measure the tensile and shear strength of materials.</td>
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<td>5. Evaluate the hardness and impact strength of materials.</td>
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<td>6. Evaluate the compression strength of helical springs.</td>
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<th>18</th>
<th>18BEAE451</th>
<th>Course Oriented Project - I</th>
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<td></td>
<td>1. Identify a problem and develop the solutions.</td>
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<td>Topics</td>
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| 18BEAE452  | Fuels And Lubricants         | 2. Identify, formulate and analyse problems and justify solutions using scientific knowledge.  
3. Apply technical ideas, strategies and methodologies.  
4. Design and conduct experiments, as well as analyse and interpret data.  
5. Familiar with cost-effectiveness analysis.  
1. Explain the manufacturing process of fuels and lubricants.  
2. Describe the refining process  
3. Define the various terminologies associated with fuel.  
4. Explain the manufacture of automotive lubricants  
5. Explain the thermo-chemistry of fuels.  
6. Select the suitable lubrication type for a particular application. |
2. Design shaft for various engineering applications.  
3. Design couplings for various engineering applications.  
4. Design bolted and welded joints subjected to static and eccentric loading conditions.  
5. Design helical spring and flywheel for various engineering applications.  
6. Design and select journal bearings and rolling contact bearings for various machines. |
| 17BEAE502  | IC Engine Design             | 1. Design cylinder and piston for the specified power and torque.  
2. Design connecting rod of an engine.  
3. Design crankshaft of an engine.  
4. Design valves and valve actuating components.  
5. Select suitable timing belt and pulley.  
6. Select suitable transmission chains and sprockets |
| 17BEAE503  | Vehicle Dynamics             | 1. Explain the basic elements of vibration of single degree of freedom system.  
2. Analyse the cornering and tractive property of a tyre.  
3. Understand the sources of vibration  
4. Design and analyse the suspension system of a vehicle.  
5. Analyse the gradeability, tractive force, braking force and stopping distance of a vehicle.  
6. Apply steady state cornering model to design the steering system of a vehicle. |
| 17BEAE504  | Manufacturing Technology     | 1. List and explain the steps involved in the casting process.  
2. Understand the theory of metal cutting  
3. Select the suitable type of machine for machining operations.  
4. Describe the types of grinding process. |
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<th>No.</th>
<th>Roll No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Activities</th>
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</thead>
</table>
| 24  | 17BEAE505A | Mechatronics | | 5. Select the suitable material handling and storage system for flexible manufacturing systems.  
6. Select appropriate rapid prototyping process for engineering applications. |
| 25  | 17BEAE5E04 | Two And Three-Wheeler Technology | | 1. Select the different types of sensor for various mechatronics applications.  
2. Identify suitable actuator used in a mechatronic system.  
3. Design a feedback controller for mechatronic systems.  
4. Develop a controller using microcontroller for the mechatronic system.  
5. Describe the PLC.  
6. Write a program for PLC used in the mechatronic systems. |
| 26  | 17BEAE511 | Thermal Engineering Laboratory | | 1. Construct the frames of two and three wheelers of different layouts.  
2. Demonstrate the constructional details and principle of operation of various engine components.  
3. Identify and explain the types of transmission systems.  
4. Identify and explain the types of steering and suspension systems.  
5. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.  
6. Explain the servicing of two and three wheelers. |
| 27  | 17BEAE512 | Dynamics And mechatronics Laboratory | | 1. Select the suitable governor for various engineering applications.  
2. Familiar with gyroscopic law and determine the gyroscopic couple  
3. Estimate the balancing mass for rotating and reciprocating masses.  
4. Calculate the natural frequency of transverse and torsional vibration.  
5. Select the different types of sensor for various mechatronics applications.  
6. Develop a controller using the microcontroller for mechatronic system. |
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<th>Page</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 28   | 17BEAE513   | Course Oriented Project – III              | 1. Identify a problem and develop the solutions.  
2. Identify, formulate and analyse problems and justify solutions using scientific knowledge.  
3. Apply technical ideas, strategies and methodologies.  
4. Design and conduct experiments, as well as analyse and interpret data.  
5. Familiar with cost-effectiveness analysis.  
| 29   | 17BEAE551   | In-Plant Training                          | 1. Apply theoretical knowledge to practical work situations.  
2. Become updated with all the modern changes in technological world.  
3. Learn, practice and acquire the skills necessary  
4. Acquire knowledge through interaction with professionals  
5. Prepare report and presentation with effective visual aids.  
6. To deliver effective presentation with clarity. |
| 30   | 17BEAE552   | Technical Presentation                     | 1. Refer and utilise various technical resources available from multiple fields.  
2. Demonstrate sound technical knowledge on a given topic.  
3. Learn, practice and acquire the skills necessary  
4. Use a structured presentation methodology to prepare presentation material and effective visual aids.  
5. Determine and develop personal presentation style.  
6. To deliver effective presentation with clarity. |
| 31   | 17BEAE601   | Automotive Chassis Design                  | 1. Design the frame and springs for automotive.  
2. Analyse the loads, moments and stresses at different sections of front axle.  
3. Design a suitable clutch for various engineering applications.  
4. Design the gearbox for various engineering applications.  
5. Design the propeller shaft to transmit required torque.  
6. Design the rear axle shafts. |
| 32   | 17BEAE602   | Industrial Engineering And Operations Research | 1. Select suitable production planning methodologies, production system and plant layout for the industry.  
2. Execute an effective work study and ergonomics for better productivity.  
3. Formulate and select a suitable method to solve the linear programming problem.  
4. Solve different transportation and assignment-based models.  
5. Solve the inventory decision-making problem using mathematical modelling.  
6. Describe the economic order quantity. |
<p>| 33   | 17BEAE603   | Vehicle Body Engineering And Safety        | 1. Distinguish the various aerodynamic forces and moments. |</p>
<table>
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<th>Page</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Tasks</th>
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</table>
| 2.   | 17BEAE604   | Production Process For Automotive Components         | 1. Select the materials for the components based on its functionality.  
2. Analyse suitable process for the manufacturing automotive components.  
3. List the casted and forged engine components.  
4. Select suitable surface coating technologies for the components.  
5. Describe the emission control system.  
6. Explain the stretch forming of auto body panels. |
| 3.   | 17BEAE6E06  | Quality Control And Reliability Engineering          | 1. Summarise the concept of quality and process control for variables.  
2. Apply the process control for attributes.  
3. Explain the importance of sampling methods and their characteristics.  
4. Explain the concept of life testing.  
5. Evaluate the reliability concept with their models.  
6. Explain the product life cycles. |
| 4.   | 17BEAE611   | Automobile Vehicle Maintenance And Re-Conditioning Laboratory | 1. List the procedure for servicing of an automobile.  
2. Demonstrate the tuning of gasoline engines.  
3. Demonstrate the tuning of diesel engines.  
4. Identify the fault in electrical and electronic ignition systems.  
5. Analyse and troubleshoot the faults of fuel feed system, charging system, starting system and lighting system.  
6. Demonstrate the adjustment of the headlight beam. |
| 5.   | 17BEAE612   | Manufacturing Processes Laboratory                   | 1. Perform various operations on of lathe machine.  
2. Prepare a flat and contour surface using milling machine.  
3. Prepare holes with higher finish by Drilling / Tapping / Reaming.  
4. Perform surface and cylindrical grinding operations for surface finish.  
5. Prepare Surface preparation and etching techniques, heat treatment and metallographic studies.  
6. Perform various Forging processes. |
| 6.   | 17BEAE613   | Mini Project                                          | 1. Demonstrate sound technical knowledge of a selected project topic.  
2. Apply the knowledge of mathematics, science and engineering to solve complex engineering problems. |
<table>
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<th>Page</th>
<th>Code</th>
<th>Course Title</th>
<th>1.</th>
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<th>3.</th>
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<th>6.</th>
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<tbody>
<tr>
<td>39</td>
<td>17BEAE651</td>
<td>Engine And Vehicle Management Systems</td>
<td>Sketch the layout and explain the working of engine management systems.</td>
<td>Explain the Microprocessor architecture</td>
<td>Describe the working of the fuel system components</td>
<td>Discuss the working of various vehicle management systems.</td>
<td>Explain the vehicle security systems.</td>
<td>Discuss the working of various vehicle management systems.</td>
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<tr>
<td>40</td>
<td>16BECC701</td>
<td>Professional Ethics &amp; Principles Of Management And Entrepreneurship Development</td>
<td>Explain the human values.</td>
<td>Implement the importance of ethics and professionalism.</td>
<td>Practice the process of management’s four functions.</td>
<td>Understand the stress management</td>
<td>Understand the budgetary and non-budgetary control technique</td>
<td>Understand the entrepreneurial characteristics.</td>
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<tr>
<td>41</td>
<td>16BEAE702</td>
<td>Finite Element Analysis</td>
<td>Apply the numerical methods to formulate the simple finite element problems.</td>
<td>Apply the one-dimensional finite element method to solve bar, beam and truss type problems.</td>
<td>Apply the finite element method for plane stress, plane strain and axisymmetric conditions.</td>
<td>Determine the temperature distribution of one and two dimensional heat transfer problems using one and two dimensional finite elements.</td>
<td>Apply the numerical methods to formulate the higher order and isoperimetric problems.</td>
<td>Apply Gaussian quadrature method.</td>
</tr>
<tr>
<td>42</td>
<td>16BEAE7E04</td>
<td>Process Planning And Cost Estimation</td>
<td>Explain the concepts of process planning and cost estimation.</td>
<td>Assess the importance of cost estimation process and its procedures.</td>
<td>Compute direct, indirect and overhead expenses.</td>
<td>Determine the production cost of forging, welding, and foundry.</td>
<td>Calculate the machining time for lathe, drilling, boring and shaping operations.</td>
<td>Calculate the machining time for milling and grinding operations.</td>
</tr>
<tr>
<td>43</td>
<td>16BTAROE01</td>
<td>Non Destructive Testing</td>
<td>Select appropriate surface inspection techniques for the components to be inspected.</td>
<td>Explain the magnetic particle testing method for ferrous materials.</td>
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<td>3.</td>
<td>Select and explain the suitable testing method for testing internal defects.</td>
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<td>4.</td>
<td>Apply radiography testing methods for different suitable applications.</td>
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<td>5.</td>
<td>Understand the acoustic emission testing principle</td>
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<td>6.</td>
<td>Choose a suitable special non-destructive technique for various applications.</td>
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<td>44</td>
<td>16BESHOE07</td>
<td>Applied Electrochemistry</td>
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<td>1. Outline the basic principles of chemistry in electrochemical material.</td>
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<td>2. Examine the properties of conducting polymers.</td>
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<td>3. Apply the concepts of electrochemistry in storage devices.</td>
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<td>4. Identify the concepts of storage devices and their applications.</td>
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<td>5. Apply suitable materials for the manufacturing of storage devices.</td>
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<td>6. Integrate the chemical principles in the projects undertaken in the field of engineering and technology.</td>
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<tr>
<td>45</td>
<td>16BEAE711</td>
<td>Auto Scanning And Vehicle Testing Laboratory</td>
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<td>2. Perform wheel balancing.</td>
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<td>3. Perform wheel alignment.</td>
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<td>4. Understand Head light focusing test.</td>
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<td>5. Perform emission test.</td>
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<td>6. Perform Braking distance test and Visibility test</td>
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<td>46</td>
<td>16BEAE712</td>
<td>Computer Aided Design Analysis Laboratory</td>
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<td></td>
<td>1. Analysis of piston and connecting rod using FEA software.</td>
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<td>2. Analysis of bumper using FEA software.</td>
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<td>3. Analysis of leaf spring using FEA software.</td>
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<td>4. Analysis of composite structure using FEA software</td>
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<td>5. Find the temperature distribution for heat conduction using FEA software.</td>
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<td>6. Dynamic analysis of the simple structure using FEA software.</td>
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<td>47</td>
<td>16BEAE791</td>
<td>Project Work Phase - I</td>
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<td>1. Demonstrate a sound technical knowledge of their selected project topic.</td>
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<td>2. Apply the knowledge of mathematics, science and engineering to solve complex engineering problems.</td>
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<td>3. Identify, formulate and analyse problems and justify solutions using scientific knowledge.</td>
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<td>4. Design and conduct experiments, as well as analyse and interpret data.</td>
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<td>5. Familiar with cost-effectiveness analysis.</td>
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<td>48</td>
<td>16BEAE801</td>
<td>Total Quality Management</td>
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<td>1. Use the concepts, dimension of quality and philosophies of TQM.</td>
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<td>2. Apply the principles of TQM and its strategies in industries.</td>
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<td>3. Apply the statistical quality tools and seven management tools.</td>
<td>4. Choose suitable TQM tools for continuous improvement.</td>
<td>5. Understand the Failure Modes and Effects Analysis.</td>
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<td>6. Use the concepts of quality management system in industries.</td>
<td>1. Explain the construction layout and features of off-road vehicles.</td>
<td>2. Select earth moving constructional machine for a particular application.</td>
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<td>3. Describe the construction details and working of industrial vehicles.</td>
<td>4. State the special features of tractor attachments and military vehicles.</td>
<td>5. Illustrate the mechanism of brake.</td>
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<td>6. Illustrate the mechanism of suspension and steering.</td>
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<td>49</td>
<td>16BEAE8E03</td>
<td>Off Road Vehicles</td>
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<td>1. Demonstrate sound technical knowledge of the project topic.</td>
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<td>5. Execute the project based on the design developed during phase - I.</td>
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<tr>
<td>Sl. No.</td>
<td>Course Code</td>
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| 1.     | 19BTBT101   | Mathematics-I                            | 1. To understand of the ideas of limits and continuity and ability to calculate with them and apply them.  
2. To apply various techniques in solving Partial Differential Equations  
3. To Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.  
4. To apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.  
5. To understand the ideas of differential equations and facility in solving simple standard examples.  
6. To improve facilities in algebraic manipulation. |
| 2.     | 19BTBT141   | Chemistry-I                               | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques  
4. Rationalise bulk properties and processes using thermodynamic considerations.  
5. List major chemical reactions that are used in the synthesis of molecules.  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology. |
| 3.     | 19BTBT142   | Basic Electrical Engineering             | 1. To understand and analyse basic electric and magnetic circuits.  
2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.  
3. Attributing the electrical machines and transformer.  
4. Evaluate the various digital circuits in real time applications.  
5. Analysis various semiconductor devices in real time applications.  
6. Reproduce the Measuring Instruments and Electrical Installation. |
| 4.     | 19BTBT111   | Engineering Graphics & Design            | 1. Introduction to engineering design and its place in society  
2. Exposure to the visual aspects of engineering design and engineering graphics standards  
3. Infer various aspects of projections in all planes.  
4. Interpret the projection aspects of solids with changing positions.  
5. Exposure to solid modelling, computer-aided geometric design, creating working drawings and |
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<th>19BTBT201</th>
<th>Mathematics – II</th>
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| 5. | 19BTBT201 | Mathematics – II | 1. To apply the Eigen values and eigenvectors, diagonalization of a matrix, nature and they will also be able to use matrix algebra techniques for practical applications.  
2. To find grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities, to evaluate line, surface and volume integrals in simple coordinate systems and to use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.  
3. To find the Analytic functions using the Cauchy Riemann equations and they will learn mapping properties of elementary functions and mapping properties of some special transcendental functions. They will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.  
4. To evaluate complex integrals using the Cauchy’s integral formula and the Residue theorem and to appreciate how complex methods can be used to prove some important theoretical results.  
5. To apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.  
6. In applying the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in their respective fields. |

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<th>19BTBT202</th>
<th>English</th>
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2. Enrich comprehension and acquisition of speaking & writing ability.  
4. Improve word power: lexical, grammatical and communication competence.  
5. To guide the students to write business letters and other forms of technical writing.  
6. To enable students to prepare for oral communication in formal contexts. |

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<th>19BTBT241</th>
<th>Engineering Physics</th>
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| 7. | 19BTBT241 | Engineering Physics | 1. Identify the elastic nature of materials.  
2. Infer the characteristics of laser for various engineering applications.  
3. Extend the knowledge on optical fibre for communication purposes.  
4. Illustrate the thermal properties of materials through various methods.  
5. Develop the idea of quantum mechanics through applications.  
6. Identify the different atomic arrangements of engineering communication  
6. Understand the basics to use various techniques in graphics and design. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 19BTBT242  | Programming for Problem Solving                  | 1. To formulate simple algorithms for arithmetic and logical problems  
2. To translate the algorithms to programs (in C language)  
3. To test and execute the programs and correct syntax and logical errors  
4. To implement conditional branching, iteration and recursion  
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach  
6. To use arrays, pointers and structures to formulate algorithms and programs. |
| 19BTBT243  | Biochemistry I                                   | 1. Outline the cellular foundations of Biochemistry  
2. Interpret different types of biomolecules and its interaction with water.  
3. Analyze the function and properties of carbohydrates.  
4. Explain the importance of amino acids, Peptides, Proteins and lipids.  
5. Examine the structure, function and properties of nucleotides, nucleic acid, DNA.  
6. Assess various functions and properties of important biomolecule. |
| 18BTBT301  | Transforms and partial differential equation     | 1. Understand how to solve the given standard partial differential equations.  
2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.  
3. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.  
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.  
5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.  
6. The learners can equip themselves in the transform techniques and solve partial differential equations. |
| 18BTBT302  | Cell Biology                                     | 1. Summarize the structure and function of cell components  
2. Understand the role of the cytoskeletal proteins and link it with cell cycle.  
3. Illustrate the transport process across the cell membrane.  
4. Outline the basic ideas on signalling process through the receptors.  
5. Explain the electron transfer in mitochondria.  
6. Relate the importance of cell signalling process to understand diseases. |
<p>| 18BTBT303  | Microbiology                                     | 1. Outline the history of microbiology and microbial |</p>
<table>
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<tr>
<th>13.</th>
<th>18BTBT304</th>
<th>Principles of Chemical Engineering</th>
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<tbody>
<tr>
<td>1.</td>
<td>Outline the basic chemical calculations and the basic laws governing it.</td>
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<tr>
<td>2.</td>
<td>Illustrate basic laws of thermodynamics.</td>
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<td>3.</td>
<td>Infer the overall material balances of chemical reactions and its basic calculations.</td>
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<td>4.</td>
<td>Outline the application of fluid flow mechanics in chemical engineering.</td>
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<td>5.</td>
<td>Discuss the fluid flow and its measurements.</td>
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<tr>
<td>6.</td>
<td>Understand the basic principles of chemical calculations and measurements.</td>
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<tr>
<th>14.</th>
<th>18BTBT305</th>
<th>Instrumental Methods of analysis</th>
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<tbody>
<tr>
<td>1.</td>
<td>Infer the various sources and properties of electromagnetic radiation.</td>
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<td>2.</td>
<td>Discuss the theory of molecular absorption spectroscopy.</td>
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<td>3.</td>
<td>Relate the theory, instrumentation and applications of various molecular spectrosopies.</td>
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<td>4.</td>
<td>Interpret the theory and instrumentation of magnetic resonance and mass spectroscopy.</td>
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<td>5.</td>
<td>Identify the various chromatographic and electrophoresis techniques for purification.</td>
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<td>6.</td>
<td>Explain the instrumentation and applications of different thermal analysis techniques.</td>
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<tr>
<th>15.</th>
<th>18BTBT311</th>
<th>Cell Biology and Microbiology Lab</th>
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<tbody>
<tr>
<td>1.</td>
<td>Illustrate the handling of microscope and categorize the cells present in the biological sample.</td>
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<tr>
<td>2.</td>
<td>Interpret the various staining techniques to identify the cell.</td>
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<td>3.</td>
<td>Outline the stages of mitosis.</td>
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<td>4.</td>
<td>Understand the growth of the organism and the parameters that influences their stability to grow.</td>
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<td>5.</td>
<td>Understand the knowledge about the chemicals that controls the bacterial growth.</td>
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<td>6.</td>
<td>Recall the growth curve and the control of microorganisms.</td>
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<tr>
<th>16.</th>
<th>18BTBT351</th>
<th>Constitution of India</th>
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<tbody>
<tr>
<td>1.</td>
<td>Describe the functions of the Indian government.</td>
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<td>2.</td>
<td>Tell about the rules of the Indian constitution.</td>
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<tr>
<td>3.</td>
<td>Understand and appreciate different culture among the people.</td>
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<tr>
<td>4.</td>
<td>Explain the structure and its respective functions of central government</td>
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<td>5.</td>
<td>Outline the basic features of state government and its structure</td>
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<td>6.</td>
<td>Analyze the different forms of Indian citizen sectors in the society</td>
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<td></td>
<td>Course Code</td>
<td>Course Title</td>
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</table>
| 17. | 18BTBT352 | Synthesis of Organic molecules | 1. Experiment the synthesis techniques of aspirin  
2. Perform the synthesis methods of p-nitroacetanilide  
3. Analyze the preparation process of Acetanilide from Aniline  
4. Perform the extraction of lycopene from given source  
5. Outline the techniques to prepare alpha D-glucopyranose pentaacetate, 1,2,5,6-dicyclohexylidine- alpha-D-glucofuranose  
6. Demonstrate the synthesis of organic molecules. |
| 18. | 18BTBT401 | Probability and Biostatistics | 1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.  
2. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.  
3. Apply the concept of testing of hypothesis for small and large samples in real life problems.  
4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.  
5. Have the notion of sampling distributions and statistical techniques used in engineering and management problems.  
6. To expose statistical methods designed to contribute to the process of making the judgements. |
| 19. | 18BTBT402 | Unit operations | 1. Interpret the properties of mixing and agitation in different flow systems.  
2. Outline the basic principle of filtration and its application in different filtration methods.  
3. Discuss the modes of heat transfer.  
4. Illustrate the mechanism of heat transfer through different dimensional surfaces.  
5. Infer the basics of convectional heat transfer in different surfaces.  
6. Appraise the basics of design, equipmentation and calculations of evaporators and heat exchangers. |
| 20. | 18BTBT403 | Chemical Thermodynamics | 1. Discuss the various properties of the fluids and its calculations.  
2. Explain the concept of solution thermodynamics and composition models.  
3. Analyze the criteria of phase equilibria for different component system.  
4. Apply the concept of chemical reaction equilibria and equilibrium conversion.  
5. Analyze the thermodynamic flow process.  
6. Illustrate the working principles and the process involved in the refrigeration and Liquefaction system. |
| 21. | 18BTBT404 | Basics of Industrial Biotechnology | 1. Outline the scope of biotechnology and its commercial potential.  
2. Interpret the modern biotechnological processing. |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>18BTBT405</td>
<td>Molecular Biology</td>
<td>1. Discuss the concepts related to eukaryotic and prokaryotic genetics.</td>
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<td>2. Identify the structure of nucleic acids, DNA replication and chromosome organization.</td>
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<td>3. Illustrate the prokaryotic and eukaryotic transcription, and its post transcriptional modifications.</td>
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<td>4. Outline the concept of genetic code, translation process and post translational modifications.</td>
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<td>5. Interpret the process of regulation of gene expression and its importance.</td>
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<td>6. Identify the different types of mutation and DNA repair mechanisms.</td>
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<tr>
<td>18BTBT411</td>
<td>Chemical Engineering Lab</td>
<td>1. Outline the chemical engineering principles and operations.</td>
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<td>2. Calculate the flow measurements and pressure drop in pipes and different reactors.</td>
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<td>3. Analyze the process of filtration and heat transfer.</td>
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<td>4. Perform the distillation and extraction.</td>
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<td>5. Demonstrate the process involved in adsorption equilibrium.</td>
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<td>6. Demonstrate the process involved in leaching.</td>
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<tr>
<td>18BTBT451</td>
<td>Production of commercially valuable</td>
<td>1. Understand the ethanol production strategies and methods from molasses and grapes</td>
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<td>2. Experiment the production of biofertilizers from</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Bioproducts</td>
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<td>2. Interpret the design of bioreactors.</td>
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<td>3. Describe the scale up of bioreactors.</td>
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<td>4. Infer the different types of bioprocess simulation and modelling</td>
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<td>5. Examine the immobilized enzyme kinetics and its significance.</td>
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<td>6. Outline the commercial production of bioproducts.</td>
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<td>27. 17BTBT502</td>
<td>Genetic Engineering</td>
<td>1. Discuss the knowledge on the basics of rDNA technology.</td>
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<td>2. Outline the usage of recombinant molecules in research and development.</td>
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<td>3. Understand gene libraries construction and to perform blottings.</td>
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<td>4. Interpret the in-depth knowledge acquired to perform PCR reactions and their types.</td>
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<td>5. Infer the importance of DNA sequencing methods.</td>
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<td>6. Summarize the concept of rDNA technology and its importance in cloning, gene therapy and relate its applications.</td>
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<td>2. Interpret the modern biotechnological processing techniques for the production of commercial bioproducts.</td>
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<td>3. Illustrate the production methods of primary metabolites.</td>
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<td>4. Illustrate the production methods of secondary metabolites.</td>
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<td>5. Infer the knowledge on commercial enzyme and bioproduct production.</td>
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<td>6. Explain the production of various commercially available products using recombinant technology.</td>
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<td>29. 17BTBT504A</td>
<td>Bioinformatics</td>
<td>1. Outline the scope of biotechnology and its commercial potential.</td>
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<td>2. Interpret the modern biotechnological processing techniques for the production of commercial bioproducts.</td>
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<td>5. Infer the knowledge on commercial enzyme and bioproduct production.</td>
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<td>30.</td>
<td>17BTBT505B</td>
<td>Food Biotechnology</td>
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<td>31.</td>
<td>17BTBT5E01</td>
<td>Animal Biotechnology</td>
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<td>32.</td>
<td>17BTBT5E02</td>
<td>Entrepreneurship in Biotechnology</td>
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<td>33.</td>
<td>17BTBT511</td>
<td>Bioprocess Lab</td>
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<td>34.</td>
<td>17BTBT512</td>
<td>Molecular Biology and Genetic Engineering Lab</td>
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<td>35.</td>
<td>17BTBT513A</td>
<td>Bioinformatics Lab</td>
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</table>
|   | technology and implement its techniques in research and development. | 1. Outline the techniques to retrieve sequences from different biological databases.  
2. Discuss the pattern matching by pairwise and multiple sequence alignment  
3. Construct phylogenetic tree by using distance based and character-based methods  
4. Predict and validate structural features of protein.  
5. Understand the primer designing steps for cloning.  
6. Perform basic bioinformatics research using online tools |
| 36. | 17BTBT551 | Separation of Bioactive Compounds from Plant Material |
|   |   | 1. Explain the isolation and extraction of natural bioactive compounds from various sources  
2. Outline the different chromatographic techniques for the separation of bioactive compounds from the mixture  
3. Determine the nature of compounds using analytical tools  
4. Perform the extraction of bioactive compounds from tea leaves.  
5. Analyze and purify the caffeine from the tea leaf extract  
6. Experiment compound isolation from the natural source |
| 37. | 17BTBT601 | Mass Transfer Operations |
|   |   | 1. Discuss the molecular diffusions and mass transfer operation in different system.  
2. Outline the absorption principles and its concepts for gas liquid operations.  
3. Infer the basic concept of equilibria and distillation concepts in vapour liquid operations.  
4. Understand the HETP, HTU and NTU concepts.  
5. Interpret the equilibria of different systems in extraction and leaching operations.  
6. Outline the concepts of adsorption and drying in solid – fluid operations. |
| 38. | 17BTBT602 | Immunology |
|   |   | 1. Discuss the cells and components of immune system.  
2. Explain the basics of B, T cells, genes and generation of antibody and its functions.  
3. Infer the basic views on monoclonal antibodies and antigen-antibody interactions.  
4. Discuss the concept of immunity and various immunological responses to infections.  
5. Discuss the basics of Transplantation and tumor therapies.  
6. To illustrate the current trends in treatment of autoimmune disease. |
| 39. | 17BTBT603A | Biopharmaceutical technology |
|   |   | 1. Illustrate the different pharmaceutical parameters for the current and future biotechnology related products on the market.  
2. Outline the concepts of Pharmacokinetics.  
3. Infer the basic knowledge on drug process, manufacturing methods and its application.  
4. Discuss about the solid dosage forms of drug |
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>40.</td>
<td>17BTBT604B Nanobiotechnology</td>
<td>1. Summarize the characteristics different nanoparticles.</td>
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<td></td>
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<td>2. Evaluate the different structural and functional principles of biotechnology.</td>
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<td>3. Explain the microfluidic devices.</td>
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<td>4. Discuss the protein and DNA based nanostructures.</td>
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<td>5. Recognize cancer curing nanoparticles.</td>
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<td></td>
<td>6. Identify and list different nanoparticles for different controlling measures.</td>
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<tr>
<td>41.</td>
<td>17BTBT611 Immunology Lab</td>
<td>1. Infer the basic handling techniques for animal studies.</td>
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<td></td>
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<td>2. Outline the basics of isolation and identification of cells and blood group.</td>
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<td>3. Illustrate the Immuno electrophoresis and Immuno diffusion for determination of antibody.</td>
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<td>4. Understand the knowledge about ELISA and western blotting for identification of various diseases.</td>
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<td>5. Explain the identification of typhoid antigens by Widal test.</td>
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<td>6. Discuss principles of T-cell resetting.</td>
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<tr>
<td>42.</td>
<td>17BTBT612A Biopharmaceutical Technology Lab</td>
<td>1. Demonstrate the procedure for tablet and granules preparation using wet and dry granulation methods</td>
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<td></td>
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<td>2. Analyze the prepared formulation for quality control</td>
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<td></td>
<td>3. Experiment the synthesis of liquid oral syrups</td>
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<td></td>
<td>4. Perform the tropical preparation formulations using a standard method</td>
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<td>5. Interpret the quality and quantity of Riboflavin tablets using assays</td>
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<td>6. Analyze the dextrose injection using typical assays.</td>
</tr>
<tr>
<td>43.</td>
<td>16BTCC701 Professional Ethics, Principles of Management and Entrepreneurship development</td>
<td>1. Explain the engineering ethics</td>
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<td></td>
<td></td>
<td>2. Outline the Moral and Social Values and Loyalty</td>
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<td>3. Justify the rights of other</td>
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<td>4. Illustrate the values of leadership skills</td>
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<td>5. Assess the skills of entrepreneur</td>
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<td></td>
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<td>6. Discuss the management skills</td>
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<tr>
<td>44.</td>
<td>16BTBT702 Downstream Processing</td>
<td>1. Outline the principles involved in downstream processing and characteristics of biomolecules.</td>
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<td>2. Discuss the various cell disruption techniques for product release.</td>
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<td>3. Illustrate the different physical methods of separation of bioproducts.</td>
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<td>4. Relate and apply the methods available for the isolation of products.</td>
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<td>5. Discuss the techniques used for the product purification.</td>
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<td><strong>6.</strong> Outline the principles for the final product formulation and finishing operations.</td>
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<td><strong>45.</strong> 16BTBT7E02</td>
<td>Environmental Biotechnology</td>
<td>1. Summarize the characteristics of soil microbes and its interactions. 2. Evaluate the different xenobiotics present and methods to degrade them. 3. Describe the industrial waste management systems. 4. List the opportunities in waste treatment industries and its management. 5. Recognize natural and engineered biotreatment methods to remediate pollutants. 6. Identify and list different environmental issues and its remedy.</td>
</tr>
<tr>
<td><strong>46.</strong> 16BTBT7E04</td>
<td>Cancer biology</td>
<td>1. Understand the fundamentals of cancer biology 2. Interpret the mechanism of carcinogenesis 3. Outline the principles of molecular cell biology 4. Understand the significance of cancer metastasis 5. Summarize the different types of cancer therapy 6. Recall the molecular tools of cancer diagnosis</td>
</tr>
<tr>
<td><strong>47.</strong> 16BTSHOE05</td>
<td>Solid Waste Management</td>
<td>1. Outline the basic principles of Solid waste and separation of wastes(K) 2. Identify the concepts of treatment of solid wastes (S) 3. Identify the methods of wastes disposals. (S) 4. Examine the level of Hazardousness and its management. (S) 5. Examine the possible of the energy production using waste materials. (S) 6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)</td>
</tr>
<tr>
<td><strong>48.</strong> 16BEEEOE04</td>
<td>Renewable Energy Resources</td>
<td>1. Explain the Utilization and conservation of different types of renewable energy sources 2. Summarize the production, estimation, application and storage of solar energy 3. Describe the fundamentals of conversion, application, types and schemes of electricity generation using wind energy 4. Outline the conversion of hydro energy from different types of sources for the utilization of electrical energy. 5. Identify the other forms of energy sources like magnetic, thermal and biological sources for the electrical energy generation 6. Infer the basics on electrical energy production and utilization from various forms of renewable energy sources</td>
</tr>
<tr>
<td><strong>49.</strong> 16BTBT711</td>
<td>Downstream Processing Lab</td>
<td>1. Perform the various methods of precipitation for the protein purification. 2. Practice and evaluate the extraction of various products from the given sample. 3. Demonstrate the finishing operations such as crystallization and drying. 4. Execute the process of centrifugation for cell</td>
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| 50. 16BTBT8E03 | Stem cell technology | 1. Summarize the characteristics of stem cells.  
2. Evaluate the different structural and functional parameters of in vitro fertilization.  
3. List the properties of adult stem cells in differentiation.  
4. Explain the uses of stem cells in drug discovery and tissue engineering.  
5. Recognize various stem cell therapies.  
6. Identify and list different nanoparticles for different controlling measures. |
| 51. 16BTBT8E07 | IPR and ethical issues in biotechnology | 1. Discuss the concept behind biosafety and protocol to follow the biosafety in formulating biological products.  
2. Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.  
3. Outline the basics on IPR policies and its procedure to be followed during biological product production and commercialization.  
4. Describe the applications of patents and copyrights for bioproducts.  
5. Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.  
6. Tell about the bioethics to be followed while handling genetic and recombinant technologies. |
| 52. 16BTBT8E04 | Biomass energy | 1. Compare and contrast energy use as renewable and non-renewable energy.  
2. Synthesize the biomass for renewable energy production.  
3. Prioritize diverse properties of fuels.  
4. Construct and design the bioenergy production through agricultural wastes.  
5. Apply the knowledge on downstream processing for bioenergy production.  
6. Examine and solve the problems related to bioenergy production. |
Name of the Department: **Biomedical Engineering**

**Course:** B.E. Biomedical Engineering

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.      | 19BEBME101  | Mathematics – I     | 1. Evaluate the limits and continuity of various functions.  
               2. Apply various techniques to solve Partial Differential Equations  
               3. Find an appropriate method to solve the given integral.  
               4. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.  
               5. Solve simple standard examples using the ideas of differential equations.  
               6. Apply the knowledge acquired to solve various engineering problems. |
| 2.      | 19BEBME141  | Chemistry - I       | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
               2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
               3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques  
               4. Rationalise bulk properties and processes using thermodynamic considerations.  
               5. List major chemical reactions that are used in the synthesis of molecules.  
               6. Integrate the chemical principles in the projects undertaken in field of engineering and technology |
| 3.      | 19BEBME142  | Basic Electrical Engineering | At the end of this course, students will be able to  
               1. Understand and analyse basic electric and magnetic circuits.  
               2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.  
               3. Attributing the electrical machines and transformer.  
               4. Evaluate the various circuits in real time applications.  
               5. Analysis various semiconductor devices in real time applications.  
               6. Reproduce the Measuring Instruments and Electrical Installation |
| 4.      | 19BEBME143  | Programming For Problem Solving | The course will enable the students  
               1. To formulate simple algorithms for arithmetic and logical problems  
               2. To translate the algorithms to programs (in C language)  
               3. To test and execute the programs and correct syntax and logical errors |
| 5. 19BEBME201 Mathematics – II | 4. To implement conditional branching, iteration and recursion  
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach  
6. Touse arrays, pointers and structures to formulate algorithms and programs  
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems  
8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.  

| 6. 19BEBME202 English | 1. Apply advanced matrix knowledge to engineering problems.  
2. Evaluate line, surface and volume integrals in simple coordinate systems by using Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.  
3. Find the Analytic functions using the Cauchy Riemann equations and discuss how geometric structures are changing under conformal mappings.  
4. Evaluate complex integrals using the Cauchy’s integral formula and the Residue theorem.  
5. Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.  
6. Apply the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in Engineering fields.  

| 7. 19BEBME203 Introduction To Biomedical Engineering | 1. Ability to understand the concepts of medical devices and equipments.  
2. The student will learn about professional and ethical responsibility  
3. The student will learn about contemporary BME research  
4. Utilize different medical devices applied in measurement of parameters related to cardiology, neurology |
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<th>Course Code</th>
<th>Course Title</th>
<th>Details</th>
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</table>
| 19BEBME241  | 5. Identify the electrical hazards and Implement methods of patient safety  
6. List out the ethical values and issues |

8. Upon completion of this course, the students will be able  
1. Develop knowledge on the basics of properties of matter and its applications.  
2. List the concepts of sound, ultrasonics and their applications.  
3. Analyze the concepts of thermal properties of materials and advanced physics concepts of quantum theory  
4. Develop knowledge on the basics of light, laser, fibre optics and their applications.  
5. Understand the basics of crystals and their structures.  
6. Apply the knowledge gained from this course to solve the relevant problems in engineering stream. |

9. Upon completion of this course, the students will be able  
1. Demonstrate the fundamental concepts of electronic devices  
2. Build an electronic circuits using transistors.  
3. Analyze any electronic circuits logically  
4. Understand the specifications of regulators and power supply circuits.  
5. Apply positive feedback principle and design oscillators.  
6. Design multivibrator circuits. |

10. Upon completion of this course, the students will be able  
1. Be able to solve problems in different environments and develop critical thinking  
2. Be able to build and solve Transportation Models  
3. Be able to analyse Assignment Models,  
4. Be able to solve integer programming and Nonlinear programming  
5. Be able to understand Hungarian Algorithm  
6. Analyse and apply branch bound method in engineering problems |

11. Upon completion of this course, the students will be able  
1. Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.  
2. Demonstrate accurate and efficient use of advanced algebraic techniques.  
3. Demonstrate their mastery by solving non-trivial problems related to the concepts and by proving simple theorems about the statements proven by the text.  
4. Able to solve various types of partial differential equations.  
5. Able to solve engineering problems using Fourier series.  
6. Able to apply the fundamental concepts in their respective engineering fields |

12. Upon completion of this course, the students will be able  
1. Understand number systems and codes  
2. Understand basic postulates of Boolean algebra and shows the correlation between Boolean expressions |
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<tbody>
<tr>
<td>3.</td>
<td>Understand the methods for simplifying Boolean expressions.</td>
<td>13. <strong>18BEBME303</strong> C++ and Data Structures</td>
</tr>
<tr>
<td>4.</td>
<td>Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits.</td>
<td>1. Design correct programs to solve problems.</td>
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<td>5.</td>
<td>Understand the concept of memories and programmable logic devices.</td>
<td>2. Choose efficient data structures and apply them to solve problems.</td>
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<td>6.</td>
<td>Interpret the concept of synchronous and asynchronous sequential circuits.</td>
<td>3. Analyze the efficiency of programs based on time complexity.</td>
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<td>4. Prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.</td>
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<td>5. Understand the concept of function overloading, operator overloading, virtual functions and polymorphism.</td>
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<td>6. Develop programming skill and to solve engineering related problems using C++, Object Oriented Programming (OOP) and Data Structure Concepts.</td>
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<tr>
<th>14. <strong>18BEBME304</strong> Medical Physics</th>
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<tbody>
<tr>
<td>1.</td>
<td>Understand the fundamental concepts.</td>
<td>1. Understand the fundamental concepts.</td>
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<tr>
<td>2.</td>
<td>Logically analyze any electronic circuit.</td>
<td>2. Logically analyze any electronic circuit.</td>
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<tr>
<td>3.</td>
<td>Apply the logic in any application.</td>
<td>3. Apply the logic in any application.</td>
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<td>4.</td>
<td>Understand the specifications of regulators and power supply circuits.</td>
<td>4. Understand the specifications of regulators and power supply circuits.</td>
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<tr>
<td>5.</td>
<td>Apply positive feedback principle and design oscillators.</td>
<td>5. Apply positive feedback principle and design oscillators.</td>
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<tr>
<th>15. <strong>18BEBME305</strong> Fundamentals of Biochemistry</th>
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<tr>
<td>1.</td>
<td>Demonstrate the concepts of biochemistry of living cells.</td>
<td>1. Demonstrate the concepts of biochemistry of living cells.</td>
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<td>2.</td>
<td>Understand the concepts of protein biochemistry.</td>
<td>2. Understand the concepts of protein biochemistry.</td>
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<tr>
<td>3.</td>
<td>Explain about functions of each organelles and Transport of substances across biological membranes.</td>
<td>3. Explain about functions of each organelles and Transport of substances across biological membranes.</td>
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<tr>
<td>4.</td>
<td>Illustrate the structural and functional properties of carbohydrates, proteins and lipids.</td>
<td>4. Illustrate the structural and functional properties of carbohydrates, proteins and lipids.</td>
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<td>5.</td>
<td>Perceive the concepts of investigation of metabolism.</td>
<td>5. Perceive the concepts of investigation of metabolism.</td>
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<td>6.</td>
<td>Understand the structural and functional properties of various organelles and biomolecules.</td>
<td>6. Understand the structural and functional properties of various organelles and biomolecules.</td>
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<tr>
<th>16. <strong>18BEBME306</strong> Anatomy and Human Physiology</th>
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<tr>
<td>1.</td>
<td>Explain basic structure and functions of cells and its organelles.</td>
<td>1. Explain basic structure and functions of cells and its organelles.</td>
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<td>2.</td>
<td>Demonstrate about anatomy and physiology of various organ systems.</td>
<td>2. Demonstrate about anatomy and physiology of various organ systems.</td>
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<td>3.</td>
<td>Illustrate eye, ear and Endocrine glands of human.</td>
<td>3. Illustrate eye, ear and Endocrine glands of human.</td>
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<td>4.</td>
<td>Explain the interconnect of various organ systems in human body.</td>
<td>4. Explain the interconnect of various organ systems in human body.</td>
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<td>5.</td>
<td>Enlighten organs and structures involving in system formation and functions.</td>
<td>5. Enlighten organs and structures involving in system formation and functions.</td>
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</table>
| 17. 18BEBME311 | Bio Chemistry & Human Physiology Laboratory | 1. Upon completion of this course, students will be able to:  
2. Solve the quantitative test of different biomolecules  
3. Label the separation technology of proteins and amino acids.  
4. Blood group identification  
5. Estimate of blood glucose  
6. Estimate of Haemoglobin  
7. Perceive the Biochemistry laboratory functional parameters |
| 18. 18BEBME312 | Digital Electronics Laboratory                 | 1. Analyse different methods used for simplification of Boolean expressions.  
2. Design and implement Combinational circuits.  
3. Design and implement synchronous and asynchronous sequential circuits.  
4. Interpret the concept of synchronous and asynchronous sequential circuits  
5. Implement shift registers using Flip-flops.  
6. Apply the knowledge on digital circuits design |
| 19. 18BEBME401 | Probability and Statistics                     | 1. Explain the fundamental concepts of probability and standard distributions which can describe real life phenomenon.  
2. Explain the basic concepts of one and two dimensional random variables and their applications in engineering.  
3. Apply the concept of testing of hypothesis for small and large samples in real life problems.  
4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.  
5. Discuss the notion of sampling distributions and statistical techniques used in engineering and management problems.  
6. Discuss about the techniques in quality control that model engineering problems. |
| 20. 18BEBME402 | Linear Integrated Circuits                     | 1. Define linear and non-linear applications of OP – AMPS  
2. Create waveforms using OP – AMP Circuits  
3. Ability to design new analog linear circuits and develop linear IC based Systems.  
4. Understand the concept of application of waveform generators  
5. Design ADC and DAC using OP – AMPS  
6. Analyze special function ICs |
| 21. 18BEBME403 | Biosensors and Transducers                     | 1. Have a clear understanding of generalized medical instrumentation system, general properties of input transducers, static and dynamic characteristics of transducers and sensors.  
2. Demonstrate various transducers and sensors in the course.  
3. Describe the purpose and methods of measurements.  
4. Explain the principle of different sensors and its applications |
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| 18BEBME404 | Microprocessor and Microcontroller               | 1. Design assembly language programming (ALP) for different applications for 8085  
2. Compile assembly language programming (ALP) for different applications for 8086  
3. Perceive knowledge on advanced processors and controllers  
4. Create application by Interfacing memory and I/O device with controllers  
5. Demonstrate the architectures of Reduced Instruction Set Computer (RISC) and Advanced RISC Machine (ARM) processors  
6. Design and deploy the Interfacing peripherals in real time scenario. |
| 18BEBME405 | Environmental science and Engineering            | 1. To study the nature and facts about environment.  
2. finding and implementing scientific, technological, economic and political solutions to environmental problems.  
3. To study the interrelationship between living organism and environment.  
4. To appreciate the importance of environment by assessing its impact on the human world;  
5. Envision the surrounding environment, its functions and its value  
6. To understand the various ecosystems and biodiversity  
7. To study the tole of engineers in the ecosystem |
| 18BEBME406 | Analog & Digital Communication                   | 1. Apply analog and digital communication techniques.  
2. Use data and pulse communication techniques.  
3. Analyze Source and Error control coding.  
4. Gain knowledge on multi-user radio communication.  
5. Demonstrate core concepts and methods of source and error control coding  
6. Identify concepts the multi-user radio communication. |
| 18BEBME404 | Microprocessor and Microcontroller Laboratory    | 1. Write ALP Programmes for fixed and Floating Point and Arithmetic operations  
2. Interface different I/Os with processor  
3. Generate waveforms using Microprocessors  
4. Execute Programs in 8051  
5. Use Serial and Parallel Interface  
6. Perform A/D and D/A conversion |
| 18BEBME412 | Biosensors and Transducers Lab                   | 1. Interpret the characteristics of various biosensors  
2. Illustrate the importance of the sensors and transducers for medical applications.  
3. Analyse the characteristics of physiological signals  
4. Measure skin temperature  
5. Perform data acquisition of physiological signals  
6. Choose the biosensors for relevant application |
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</table>
| 17BEBME501  | Bio Control System                   | 1. Knowledge about the application of various mathematical techniques in designing a bio control system  
2. Ability to create simple models of the physiological system  
3. Design biomedical control systems  
4. Know the various order of control system and design system accordingly  
5. To learn to do the analysis of given system in time domain and frequency domain  
6. To learn to do the analysis of given system in time domain and frequency domain |
| 17BEBME502  | Medical Instrumentation              | 1. Differentiate different bio potentials and its propagations.  
2. Describe the electrode behaviour and circuit models  
3. Illustrate different electrode placement for various physiological recordings  
4. Design bio amplifier for various physiological recordings  
5. Explain various technique for non-electrical physiological measurements  
6. Measure various biochemical parameters. |
| 17BEBME503  | Biomedical Signal Processing         | 1. Design different types of biomedical signals and identify their spectral components.  
2. Utilize different filters on biomedical signals and judge filter performance.  
3. Identify physiological interferences and artifacts affecting ECG signal.  
4. Assess power and correlation spectra of EEG signal.  
5. Analyze biosignals in time and frequency domains.  
6. Perform classification and recognition Biosignals |
| 17BECC504   | Professional Ethics, Principles of Management and Entrepreneurship development | 1. Advanced philosophical knowledge of the profession of recreation and leisure  
2. Synthesis of trends and issues as related to current professional practice  
3. Evaluate organizational theories and human resource management principles  
4. Analyse the information competency  
5. Follow Ethical practice and ethical management  
6. Understand Models of Professional Roles |
| 17BEBME5E01 | Professional Elective I Medical Physics | 1. Analyze the low and high frequency effects of non-ionizing radiation and physics of light.  
2. Define various clinical applications based on ultrasound wave.  
3. Explain the process of radioactive nuclide production using different techniques.  
4. Analyze radiation mechanics involved with various physiological systems.  
5. Apply the concept of physics in the function of cardiopulmonary system.  
6. Outline the detrimental effects of radiation and regulations for radiation safety. |
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<th>Objectives</th>
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| 32. 17BEBME5E02 | Professional Elective II Biometric systems | 1. Demonstrate knowledge engineering principles underlying biometric systems.  
 2. Analyze design basic biometric system applications.  
 3. To understand the general principles of design of biometric systems and the underlying trade-offs.  
 4. To recognize personal privacy and security implications of biometrics based identification technology.  
 5. identify issues in the realistic evaluation of biometrics based systems.  
 6. Identify the correct advantages and disadvantages of each biometric method |
| 33. 17BEBME511 | Biosensors and Transducers Lab | 1. Interpret the characteristics of various biosensors  
 2. Illustrate the importance of the sensors and transducers for medical applications.  
 3. Analyse the characteristics of physiological signals  
 4. Measure skin temperature  
 5. Perform data acquisition of physiological signals  
 6. Choose the biosensors for relevant application |
| 34. 17BEBME512 | Biomedical Instrumentation & Signal Processing Lab | 1. Create coding for different convolution and correlation techniques.  
 2. Develop preamplifiers and amplifiers for various bio signal recordings.  
 3. Measure various non-electrical parameters using suitable sensors/transducers  
 4. Perform biosignal Acquisition  
 5. Analyse ECG signal  
 6. Understand about SNR improvement |
| 35. 17BEBME601 | Bio-Medical Image processing | 1. Explain the image fundamentals and mathematical transforms necessary for image processing.  
 2. Illustrate the image enhancement techniques.  
 3. Pre-process the image using filtering techniques  
 4. Utilize image restoration procedures.  
 5. Segment the region of interest in images.  
 6. Apply the image compression procedures. |
| 36. 17BEBME602 | Bio Tech Prosthetic Equipments | 1. Demonstrate about heart lung machine and artificial heart  
 2. Explain about cardiac assist devices, its continuous monitoring and transmission  
 3. Explain about prosthetic and orthodic devices  
 4. Interpret the need and use of the extracorporeal devices.  
 5. Discuss the types of deafness  
 6. Analyse various materials for Prosthetic and Orthodic devices |
| 37. 17BEBME603 | Diagnostic and Therapeutic Equipment - I | 1. Utilize different medical devices applied in measurement of parameters related to cardiology, neurology  
 2. Explain about cardiac assist devices, its continuous monitoring and transmission  
 3. Measure signals generated by muscles  
 4. Analyze different types of diathermy units. |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Content</th>
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</thead>
</table>
| 38. 17BECC604 | Healthcare and Hospital Management               | 1. Explain various information management systems and relative supportive services.  
2. Interpret market related research processes in healthcare and hospital sectors.  
3. Illustrate the quality and safety aspects in hospital.  
4. Demonstrate about human resource management in hospital  
5. Understand about NABH and NABL  
6. Explain the importance of supportive services |
| 39. 17BEBME6E02 | Professional Elective-III Telehealth Technology | 1. Apply multimedia technologies in telemedicine.  
2. Explain Protocols behind encryption techniques for secure transmission of data.  
3. Utilize telehealth in healthcare.  
4. Outline the basic concepts involved in telemetry based transmission and reception  
5. Discuss the communication devices and Networks of telemedicine.  
6. Describe telehealth systems for secure transmission of medical data and retrieval of telemedicine based information. |
| 40. 17BEBME6E04 | Professional Elective-IV Biosignal Conditioning Circuits | 1. Elaborate the fundamentals of operational amplifier circuits  
2. Apply the various applications using operational amplifiers.  
3. Use the applications of opamp  
4. Distinguish A/D and D/A conversion  
5. Design the filter circuits for various frequency range  
6. Explain the need of isolation amplifier |
| 41. 17BEBME611 | Bio-Medical Image processing Lab | 1. Apply various pre-processing techniques in Medical Images.  
2. Outline enhancement and transformation of Medical Images.  
3. Simplify and reconstruct medical images.  
4. Use MATLAB tool for image processing application  
5. Perform Image analysis  
6. Perform image compression |
| 42. 17BEBME612 | Diagnostic and Therapeutic Equipments Lab | 1. Measure different bioelectrical signals using various methods  
2. Assess different non-electrical parameters using various methodologies  
3. Illustrate various diagnostic and therapeutic techniques.  
4. Handle therapeutic equipment  
5. Design ECG amplifier  
6. Design and simulate by using Lab View |
| 43. 16BECC701 | Professional Ethics, Principles of Management and | 1. Advanced philosophical knowledge of the profession of recreation and leisure  
2. Synthesis of trends and issues as related to current professional practice |
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<tr>
<th>Code</th>
<th>Course Title</th>
<th>Course Details</th>
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</thead>
<tbody>
<tr>
<td>44. 16BEBME702A</td>
<td>Virtual Instrumentation Design for medical system /</td>
<td>1. Illustrate programming concepts of virtual instruments. 2. Compile programming structure in LabVIEW. 3. Understand the use of VI for data acquisition. 4. analyze different types of interfaces. 5. Choose data from hardware systems. 6. Develop VI programs for specific applications</td>
</tr>
<tr>
<td>45. 16BEECOE01</td>
<td>Open Elective-I Real time embedded Systems</td>
<td>1. Ability to understand embedded systems, its hardware and software. 2. Gain knowledge about devices and buses used for embedded networking. 3. Gain knowledge about task management. 4. Gain knowledge about semaphore management and message passing. 5. Gain knowledge about memory management. 6. To learn about semaphore management and message passing</td>
</tr>
<tr>
<td>46. 16BEECOE03</td>
<td>Open Elective-II Neural Networks And Its Applications</td>
<td>1. Understand the basic concepts of neural networks and its applications in various domains 2. Gain knowledge about learning process in Neural Networks 3. Apply perception concept in design 4. Design using ART phenomena 5. Gain knowledge on SOM concepts 6. Ability to develop the use of Soft Computing to solve real-world problems</td>
</tr>
<tr>
<td>48. 16BEBME711A</td>
<td>Virtual Instrumentation Design for medical system Lab</td>
<td>1. Study about Programming Techniques 2. Study about Data Acquisition and interfacing techniques 3. Do programming for process control and other applications 4. Use D/A acquisition interface 5. Use serial communication interface 6. Use Lab view software for biomedical signal analysis</td>
</tr>
<tr>
<td>49. 16BEBME8E08</td>
<td>Professional Elective-V Intellectual Property Rights</td>
<td>1. Review an intellectual property portfolio and comprehend the extent of their protection. 2. Describe the registration of copy rights, trademarks, patents and industry 3. Develop a business plan that advances the value of their intellectual property portfolio</td>
</tr>
<tr>
<td>50.</td>
<td>16BEBME8E</td>
<td>Professional Elective-VI Bio MEMS</td>
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<td>4.</td>
<td>Analyse International convention relating to Intellectual Property</td>
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<td>5.</td>
<td>Distinguish Indian Position Vs WTO and Strategies relating to Intellectual Property</td>
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<tr>
<td>6.</td>
<td>Explain some of the limits of their intellectual property rights and comprehend some basic legal pitfalls</td>
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<tr>
<td>1.</td>
<td>Discuss various MEMS fabrication techniques.</td>
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<tr>
<td>2.</td>
<td>Explain different types of sensors and actuators and their principles of operation at the microscale level.</td>
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<tr>
<td>3.</td>
<td>Apply MEMS in different field of medicine.</td>
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<tr>
<td>4.</td>
<td>Learn various MEMS fabrication techniques.</td>
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<tr>
<td>5.</td>
<td>Understand different types of sensors and actuators and their principles of operation at the microscale level.</td>
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<tr>
<td>6.</td>
<td>Know the application of MEMS indifferent</td>
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<tr>
<td>Sl. No.</td>
<td>Course Code</td>
<td>Name of the Course</td>
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</table>
| 1.     | 19BTCE101   | Mathematics-I      | After successfully completing the course, the student will have a good understanding of the following topics and their applications:  
1. In rank, consistency and its inverse in Engineering fields.  
2. Eigen values and eigenvectors, diagonalization of a matrix. Symmetric matrices and the students will be able to use matrix algebra techniques for practical applications.  
3. To recognize scalar and vector functions. Evaluate Gradient, Divergence and Curl of a point function depending upon its nature, identifying Solenoidal and Irrotational Vector fields and to use vector identities connecting these quantities in problem solving.  
4. To Calculate and establish identities connecting line, surface and volume integrals in simple coordinate systems and to Use Greens theorem to simplify calculations of integrals and prove simple results.  
5. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.  
6. To analyse and evaluate the basic concepts of mathematics like matrix operations, vectors, Fourier series etc in their specific fields. |
| 2.     | 19BTCE102   | English            | Students undergoing this course will be able to  
1. Describe English language for communication: verbal & non-verbal.  
2. Express comprehension and acquisition of speaking & writing ability.  
3. Improve the student confidence in using English language in real life situations.  
4. Develop word power: lexical, grammatical and communication competence.  
5. To prepare the students to write business letters and other forms of technical writing.  
6. Demonstrate the students to prepare for oral communication in formal contexts. |
2. Appreciate aliphatic chemistry  
3. Describe the concepts of stereochemistry  
4. Write simple mechanisms  
5. To synthesis of organic molecules  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology |
| 4.     | 19BTCE141   | Physics            | Upon completion of this course, the students will be able to |
1. List the fundamentals of Bragg’s Law, interference, diffraction and its applications.
2. Understand the principles of lasers, types of lasers and its applications and also gain the knowledge of fiber optics.
3. Integrate the basic concepts of electromagnetism, Maxwell equations Polarization, etc.
4. List the knowledge of dielectrics & magnetic properties of materials.
5. Analyze about the some of the basic laws and concepts of quantum mechanics, uncertainty principle and scanning electron microscope.
6. Illustrate the basic concepts of physics and its applications.

5. 19BTCE111 Engineering Graphics
1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design and engineering graphics standards
3. Exposure to engineering communication effectively.
4. Exposure to 3D free hand sketching.
5. Acquired the knowledge of projections of points, lines and plane surfaces.
6. Understand the basic concept of projection of solids.

6. 19BTCE201 Mathematics-II
1. To be able to solve equations using Laplace and Fourier transform
2. To solve first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.
3. To evaluate second order ordinary differential equations in various methods.
4. To apply various techniques in solving differential equations and to understand the method of finding the series solution of Bessel’s and Legendre’s differential equations.
5. Better understanding in problems related to heat condition, communication systems, electro optics and electromagnetic theory using the techniques will be learnt in this course.
6. The Learners can equip themselves in the transform techniques and solve ODEs and PDEs.

7. 19BTCE202 Chemistry-II
1. To apply the various unit process
2. Extend the principles of reaction mechanisms
3. To apply the knowledge on chemical reactions
4. To prepare soaps
5. To analyses the effect of pigments
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology

8. 19BTCE203 Thermodynamics I
1. Understand the fundamental concepts of thermodynamics.
2. Apply mass and energy balances for open systems.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>19BTCE241</td>
<td>Electrical &amp; Electronics Engineering</td>
<td>Evaluate the properties of non-ideal gases. Solve problems involving liquefaction, refrigeration and different power cycles. To apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon. To identify and formulate power production based on the fundamentals laws of thermal engineering. At the end of this course, students will be able to: 1. Understand and analyse basic electric and magnetic circuits. 2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws. 3. Analysis the real time application of transformer. 4. Evaluate the various digital circuits in real time applications. 5. Analysis various semiconductor devices in real time applications. 6. Reproduce the Measuring Instruments and Electrical Installation.</td>
</tr>
<tr>
<td>19BTCE242</td>
<td>Programming For Problem Solving</td>
<td>The course will enable the students: 1. To formulate simple algorithms for arithmetic and logical problems 2. To translate the algorithms to programs (in C language) 3. To test and execute the programs and correct syntax and logical errors 4. To implement conditional branching, iteration and recursion 5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach 6. Touse arrays, pointers and structures to formulate algorithms and programs 7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems 8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</td>
</tr>
<tr>
<td>19BTCE211</td>
<td>Chemistry Laboratory</td>
<td>1. List steps for identifying simple organic compounds 2. Use different analytical instruments 3. Identify reaction rate parameters 4. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc 5. Carrying out different types of titrations for estimation of concerned in materials using comparatively more qualities and quantities of materials involved for accurate results. 6. Students will be able to gain knowledge about various analysis</td>
</tr>
</tbody>
</table>
| 12.  | 18BTCE301 | Heat Power Engineering | 1. Acquire knowledge of HEAT POWER Engineering and be able to discriminate, evaluate, analyse and integrate existing and new knowledge  
2. Describe basic working principles of gas turbine and diesel engine power plants.  
3. Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventional steam generators (boilers)  
4. Analyse performance of various refrigeration cycles and air conditioning systems  
5. Describe construction, working of various types of reciprocating  
6. Discuss the all other performance parameters of IC Engine. |
| 13.  | 18BTCE302 | Fluid Mechanics | 1. Apply the basic concepts of fluid mechanics and to solve dimensional analysis problems.  
2. Understanding the applications of flow statics, fluid flow phenomena.  
3. Creating fluid flow reactors and solve problems on fluid flow measurements.  
4. Evaluating the pump efficiency, head developed and pressure drop.  
5. Creating problems related to mass, momentum and energy balances in fluid flow.  
6. Analysing flow behaviour of solid and liquid and to demonstrate the understanding of packed and fluidized bed. |
| 14.  | 18BTCE303 | Chemical Process Calculations | 1. Applying the principles of dimensional homogeneity to convert one form of unit to other equivalent forms in CGS, FPS. MKS and SI unit systems and apply fundamental gas laws to solve ideal gas problems.  
2. Evaluating the composition of a mixture in terms of mole fractions from a given composition expressed in terms of mass fractions or vice versa.  
3. Analysing the concentration, degree of saturation and dew point of vapor-gas mixture at the given temperature and pressure using humidity chart.  
4. Creating steady state material balance for the unit operations such as distillation, evaporation, mixing, extraction, drying and crystallization processes with recycle, by-pass and purge.  
5. Understanding the combined steady state material and Energy balance for simple processes like distillation, evaporation and combustion.  
6. Remembering the law of conservation of mass for different batch and continuous unit operations. |
| 15.  | 18BTCE304 | Mechanical Operations | 1. Understanding the Particle size, shape and surface area computation by both differential, cumulative analysis.  
2. Analysing the pressure due to storage of particles and formulate the method of transportation and fine particle recovery. |
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<tbody>
<tr>
<td>3.</td>
<td>Evaluating the terminal settling velocity, settling time and calculate the thickener area.</td>
<td>1. Applying fundamental concepts of thermodynamics to engineering applications.</td>
</tr>
<tr>
<td>4.</td>
<td>Calculate the pressure drop in filters, filter medium resistance and cake resistance.</td>
<td>2. Remembering thermodynamics to conversion devices.</td>
</tr>
<tr>
<td>5.</td>
<td>Creating the power required by mixers using power number and Reynolds number.</td>
<td>3. Analysing application of thermodynamics to phase equilibria and reaction equilibria.</td>
</tr>
<tr>
<td>6.</td>
<td>Applying the size reduction techniques of solids by selecting proper equipment such as crushers, grinders, etc.</td>
<td>4. Creating the chemical engineering equipment in processes.</td>
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<tbody>
<tr>
<td>16.</td>
<td>18BTCE305</td>
<td>Thermodynamics - II</td>
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<tr>
<td>1.</td>
<td>Applying fundamental concepts of thermodynamics to engineering applications.</td>
<td>1. Remembering the concepts of heat transfer.</td>
</tr>
<tr>
<td>2.</td>
<td>Remembering thermodynamics to conversion devices.</td>
<td>2. Understanding mechanisms of conduction, convection and radiation.</td>
</tr>
<tr>
<td>3.</td>
<td>Analysing application of thermodynamics to phase equilibria and reaction equilibria.</td>
<td>3. Analysing the performance of heat exchange equipment &amp; evaporators.</td>
</tr>
<tr>
<td>4.</td>
<td>Creating the chemical engineering equipment in processes.</td>
<td>4. Evaluating components subjected to thermal loading.</td>
</tr>
<tr>
<td>5.</td>
<td>Understanding thermodynamic properties of substances in gas and liquid states</td>
<td>5. Applying the heat transfer concept in parallel &amp; counter current flow.</td>
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<tr>
<td>17.</td>
<td>18BTCE401</td>
<td>Heat Transfer</td>
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<tr>
<td>1.</td>
<td>Remembering the concepts of heat transfer.</td>
<td>1. Remembering the diffusional mass transfer concepts.</td>
</tr>
<tr>
<td>2.</td>
<td>Understanding mechanisms of conduction, convection and radiation.</td>
<td>2. Understanding the mechanism of crystallization and absorption.</td>
</tr>
<tr>
<td>3.</td>
<td>Analysing the performance of heat exchange equipment &amp; evaporators.</td>
<td>3. Evaluating the interphase and different analogies of mass transfer.</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluating components subjected to thermal loading.</td>
<td>4. Analysing the operation of drying.</td>
</tr>
<tr>
<td>5.</td>
<td>Applying the heat transfer concept in parallel &amp; counter current flow.</td>
<td>5. Creating the design of the equipment.</td>
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<tr>
<td>6.</td>
<td>Analysing the effect of heat transfer in boiling and evaporators.</td>
<td>6. Applying recent developments in mass transfer operation.</td>
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<tbody>
<tr>
<td>18.</td>
<td>18BTCE402</td>
<td>Mass Transfer - I</td>
</tr>
<tr>
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</tr>
<tr>
<td>1.</td>
<td>Remembering the diffusional mass transfer concepts.</td>
<td>1. Identifies the contemporary technologies in water treatment and label the process economics in salt and sulphur-based industries.</td>
</tr>
<tr>
<td>2.</td>
<td>Understanding the mechanism of crystallization and absorption.</td>
<td>2. Design the production methodology of oil industries and analyse the efficiency of the products.</td>
</tr>
<tr>
<td>3.</td>
<td>Evaluating the interphase and different analogies of mass transfer.</td>
<td>3. Analyse and formulate the chemical processes and economics involved in the carbohydrate industries.</td>
</tr>
<tr>
<td>4.</td>
<td>Analysing the operation of drying.</td>
<td>4. Describe the flow sheets of manufacture process of pulp based, leather industries and engineering problems faced in the industries.</td>
</tr>
<tr>
<td>5.</td>
<td>Creating the design of the equipment.</td>
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<tr>
<td>6.</td>
<td>Applying recent developments in mass transfer operation.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<tr>
<td>5.</td>
<td>Evaluate the surface coating &amp; cement industry processes to justify their appropriate production techniques and their handling processes.</td>
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<tr>
<td>6.</td>
<td>Can describe various manufacturing processes used in chemical process industries.</td>
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</tr>
</tbody>
</table>
| 20.        | 18BTCE404 Material Science And Engineering | 1. Comprehend the criterion for selection of materials for chemical process industries.  
|            |                                            | 2. Outline the properties and applications of smart materials and nano and bio materials.  
|            |                                            | 3. Apply the knowledge about various materials used in chemical process industries.  
|            |                                            | 4. Select materials for high temperature and Sour service and gain knowledge of modern engineering materials.  
|            |                                            | 5. Be able to qualitatively derive a material's Young's modulus from a potential energy curve.  
|            |                                            | 6. Be able to describe a polymer's elastic behaviour above and below the glass transition.  |
| 21.        | 18BTCE405 Engineering Economics And Financial Management | 1. To know the fundamentals of cost analysis and economics.  
|            |                                            | 2. To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.  
|            |                                            | 3. To make the students to understand capital market, break-even point analysis and depreciation.  
|            |                                            | 4. Evaluate the economic theories, cost concepts and pricing policies.  
|            |                                            | 5. Understand accounting systems and analyse financial statements using ratio analysis.  
|            |                                            | 6. Understand the measures of national income, the functions of banks and concepts of globalization.  |
| 22.        | 18BTCE406 Environmental Sciences            | 1. Remembering the importance of natural resources.  
|            |                                            | 2. Analysing the importance of biodiversity.  
|            |                                            | 3. Creating awareness with the various ecosystems.  
|            |                                            | 4. Applying the environmental principles in the field of engineering and technology.  
|            |                                            | 5. Evaluating and minimizing the different causes of pollutions.  
|            |                                            | 6. Understanding and analysing the social issues.  |
|            |                                            | 2. Applying the principles of reaction kinetics and formulate rate equations and analyse the batch reactor data.  
|            |                                            | 3. Analysing RTD in non-ideal flow reactors and calculation of conversion.  
|            |                                            | 4. Understanding the ideal reactor concepts and to develop the performance equation to workout conversion and space time.  
|            |                                            | 5. Remembering the reactor for the desired reaction and its design.  
<p>|            |                                            | 6. Creating reactor performance when the temperature is not uniform within the reactor.  |</p>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Modules</th>
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</thead>
</table>
| 17BTCE502   | Mass Transfer - 1                     | 1. Understand diffusional operations and theories of mass transfer.  
               |                                        | 2. Understand the concept of interphase mass transfer.                  
               |                                        | 3. Understand the concept gas-liquid mass transfer operations like humidification. 
               |                                        | 4. Apply the knowledge gained in mass transfer to perform simple calculations in drying.  
               |                                        | 5. Apply the knowledge gained in mass transfer to perform simple calculations in crystallization process. 
               |                                        | 6. Calculate tower height and number of transfer units for absorption process. |
| 17BTCE503   | Chemical Process Plant Safety And Hazard | 1. Understanding the awareness of plant safety standards, codes and MSDS in handling and storage of chemicals. 
               |                                        | 2. Analysing the legal aspects related to safety and emergency studies to know the basic rules and requirements which govern the chemical industries. 
               |                                        | 3. Evaluating the safety in industries and the various methods of safety measures and risk analysis in the industry. 
               |                                        | 4. Applying the skill in classifying chemical, fire, explosion hazards and to understand the occupational diseases. 
               |                                        | 5. Remembering safety operations and process by undergoing HAZOP and HAZAN studies. 
               |                                        | 6. Analysing the accident causes, costs, prevention techniques, accident proneness and case studies. |
| 17BTCE504   | Instrumental Methods Of Analysis      | 1. Analysing the principles of electromagnetic radiation and classification of instrumental methods. 
               |                                        | 2. Understanding the importance of AAS and NMR spectroscopy in chemical analysis. 
               |                                        | 3. Remembering the principles and applications of UV, Visible, IR Spectroscopy and Photometric titrations. 
               |                                        | 4. Understanding the principles and applications of chromatographic methods. 
               |                                        | 5. Applying the knowledge about thermo gravimetric instruments. 
               |                                        | 6. Evaluating the working principles of different types of instruments and their applications. |
| 17BTCE5E04  | Fertilizer Technology                 | 1. Understanding the role of chemical engineers in fertilizer industries and develop block diagrams and flow charts for manufacture of different chemicals. 
               |                                        | 2. Applying knowledge in the manufacture of plant nutrients, agrichemicals and fertilizers. 
<pre><code>           |                                        | 3. Remembering the unit operations/ processes in nitrogen, phosphorous, potassium and sulphur-based fertilizer industries. |
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
</table>
| 17BTCE601    | Chemical Reaction Engineering - II            | 1. Analysing difference between various RTD curves and predict the conversion from a non-ideal reactor using tracer information.  
2. Remembering rate laws for heterogeneous reactions.  
3. Creating reactors for non-catalytic and catalytic reactions.  
4. Applying the ideal reactor concepts and heterogeneous reactors.  
5. Evaluating the tower for gas liquid operations with and without chemical reaction.  
6. Understanding the basics of catalysis and industrial catalytic reactors such as gas-solid reactors. |
| 17BTCE602    | Mass Transfer - II                            | 1. Understand absorption and distillation operations and select methods of separation of mixtures based on mass transfer concepts.  
2. Design a distillation tower.  
3. Perform calculations in adsorption operation.  
4. Apply the ternary equilibrium diagram concepts to determine the number of stages required for separation of liquid-liquid and solid-liquid mixtures use the phase equilibrium concepts in mass transfer related problems.  
5. Use the phase equilibrium concepts in mass transfer related problems.  
6. Solve problems related to liquid-liquid and solid-liquid extraction. |
| 17BTCE603    | Process Dynamics Control And Instrumentation | 1. Understanding the prerequisites of control strategies to design different process control systems.  
2. Evaluating the suitable controllers for different chemical process.  
3. Analysing the closed loop response of control loops and characteristics of control values.  
4. Remembering the tuning procedures and advanced control techniques.  
5. Applying the control systems into stability.  
6. Creating a control strategy for the control of mass and heat transfer equipment using advanced controllers. |
| 17BTCE604    | Process Economics For Chemical Engineering    | 1. Gain knowledge on cost and asset accounting, time value of money, profitability, alternative investments.  
2. Demonstrate knowledge of the difference between profit/loss and cash flow.  
3. Demonstrate the ability to analyse projects for profitability. |
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<td>4.</td>
<td>Demonstrate understanding of cost estimation.</td>
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<tr>
<td>5.</td>
<td>Demonstrate ability to assess the impact of economic constraints on engineering solutions.</td>
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<tr>
<td>6.</td>
<td>Demonstrate ability to apply the knowledge of cost estimation and profitability evaluation to conduct and present the results of a case study.</td>
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<tr>
<td>32.</td>
<td>17BTCE6E01 Fluidization Engineering</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Remembering the fluidization behaviour.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Evaluating pressure drop, bubble size, void age, heat and mass transfer rates for the fluidized beds.</td>
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</tr>
<tr>
<td>3.</td>
<td>Applying the model equations for fluidized beds.</td>
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<tr>
<td>4.</td>
<td>Creating the gas-solid fluidized bed reactors.</td>
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</tr>
<tr>
<td>5.</td>
<td>Understanding the fundamental of fluidization.</td>
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<tr>
<td>6.</td>
<td>Analysing the fundamentals of fluidization engineering, different regimes, classification of particles.</td>
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<tr>
<td>33.</td>
<td>17BTCE6E02 Petroleum Refining Engineering</td>
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</tr>
<tr>
<td>1.</td>
<td>Remembering crude oils consist of and characterized based on their physical properties.</td>
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<tr>
<td>2.</td>
<td>Applying Fundamental and methodologies in the petroleum refining processes.</td>
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</tr>
<tr>
<td>3.</td>
<td>Analysing the processes used in petroleum refining.</td>
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<tr>
<td>4.</td>
<td>Understanding working of petroleum refinery and all refining processes and the resulting refinery products.</td>
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</tr>
<tr>
<td>5.</td>
<td>Evaluating the various treatment techniques of petroleum.</td>
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<tr>
<td>6.</td>
<td>Creating familiarization with upgrading process of petroleum products.</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>16BTCE702 Transport Phenomena</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Applying the shell momentum balances and velocity distribution in laminar flow and understand equation of continuity and motion.</td>
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</tr>
<tr>
<td>2.</td>
<td>Creating the shell energy balances and temperature distributions in solids and apply the equations of change to solve heat transfer problems.</td>
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</tr>
<tr>
<td>3.</td>
<td>Understanding the shell mass balance and concentration distributions in systems involving diffusion and reactions.</td>
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<tr>
<td>4.</td>
<td>Analysing the analogy between the transports processes of heat, momentum and mass transfer.</td>
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<tr>
<td>5.</td>
<td>Evaluating the shell mass balance and concentration distributions in systems involving diffusion and reactions.</td>
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</tr>
<tr>
<td>6.</td>
<td>Remembering the analogy between the transports processes of heat, momentum and mass transfer.</td>
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<tr>
<td>35.</td>
<td>16BTCE7E01 Electrochemical Engineering</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Formulate and calculate relevant transport phenomena such as migration and the characteristics of (diluted) electrolytes. Relate the conversion of matter to the transport of electrical charge.</td>
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<tr>
<td>2.</td>
<td>Evaluate the potential of electrochemical systems based on thermodynamic data and the concept of half-cells. Apply electrical circuit elements to</td>
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</tbody>
</table>
model electrochemical systems in order to calculate energy balances and to estimate efficiencies.
3. apply knowledge of electrokinetic phenomena to design microfluidic unit operations.
4. Use of technical measures to characterize properties of galvanic elements and capacitors.
5. Demonstrate fundamental knowledge of major industrial electrochemical processes and electrochemical reactor design including economic and environmental considerations.

<table>
<thead>
<tr>
<th>36.</th>
<th>16BTCE8E03</th>
<th>Pollution Control In Process Industries</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Understanding the effects of pollutants to the environment.</td>
</tr>
<tr>
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<td>2. Evaluating the various treatment technologies for water/wastewater, air effluents and solid waste released from chemical industries.</td>
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<td>3. Applying the basic concepts of pollution control in industries</td>
</tr>
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<td>4. Remembering the development of various unit operation.</td>
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<tr>
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<td>5. Analysing the problems of pollution and suggest suitable treatment methodology.</td>
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<tr>
<td></td>
<td></td>
<td>6. Creating understanding about water, air, light pollution control.</td>
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<thead>
<tr>
<th>37.</th>
<th>16BTCE8E08</th>
<th>Process Modelling And Simulation</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1. Remembering first principles and constitutive laws to develop ordinary or partial differential equations by incorporating valid assumptions for both macroscopic and microscopic systems.</td>
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<tr>
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<td>2. Analysing phenomenological models for simple and variable flow hydraulic tanks, enclosed mixing vessel with reaction, steam jacketed mixing vessel and Continuous flow boiling systems.</td>
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<td>3. Evaluating the mathematical model for simple flow systems and Homogeneous and Heterogeneous reaction kinetics.</td>
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<td>4. Creating distributed parameter model for various stage operations like binary distillation, multi stage counter current extraction and distributed systems like heat exchanger, tubular reactors and membrane separation unit.</td>
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<td>5. Applying computational techniques to solve the process models.</td>
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<td></td>
<td>6. Understanding the fundamentals of modelling and their applications in energy equations and phase equilibrium kinetics.</td>
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</tbody>
</table>
### Course Outcomes

1. After successfully completing the course, the student will have a good understanding of the following topics and their applications:
   1. In rank and Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices and the students will be able to use matrix algebra techniques for practical applications.
   2. To apply differential and integral calculus to notions of evolute and introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering application.
   3. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
   4. To understand the ideas of limits and continuity and an ability to calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.
   5. To apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition to change of order and vector integration.
   6. This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus.

2. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
   2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
   3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
   4. Rationalise bulk properties and processes using thermodynamic considerations.
   5. List major chemical reactions that are used in the synthesis of molecules.
   6. Integrate the chemical principles in the projects undertaken in field of engineering and technology.

3. Understand and analyse basic electric and magnetic circuits.
   2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.
   3. Attributing the electrical machines and transformer.
   4. Evaluate the various digital circuits in real time applications.
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<tr>
<td>4.</td>
<td>19BECE111</td>
<td>Engineering Graphics And Design</td>
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<tr>
<td></td>
<td></td>
<td>1. Introduction to engineering design and its place in society</td>
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<td>2. Exposure to the visual aspects of engineering design and engineering graphics standards</td>
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<td>3. Exposure to engineering communication effectively.</td>
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<td>4. Exposure to 3D free hand sketching.</td>
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<td></td>
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<td>5. Acquired the knowledge of projections of points, lines and plane surfaces.</td>
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<td>6. Understand the basic concept of projection of solids.</td>
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<td>5.</td>
<td>19BECE201</td>
<td>Mathematics –II</td>
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<td>The students will learn:</td>
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<td></td>
<td>1. Solve first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.</td>
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<td>2. Apply various techniques in solving differential equations and to understand the method of finding the series solution of Bessel’s and Legendre’s differential equations.</td>
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<td>3. Understand how to solve the given standard partial differential equations.</td>
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<td>4. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.</td>
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<td>5. To Evaluate complex integrals using the Cauchy integral formula and the residue Theorem and to appreciate how complex methods can be used to prove some important theoretical results.</td>
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<td>6. To understand the fundamentals and basic concepts in vector calculus, ODE, complex functions and problems related to engineering applications by using these techniques.</td>
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<td>6.</td>
<td>19BECE202</td>
<td>English</td>
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<td>Students undergoing this course will be able to</td>
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<td>1. Describe English language for communication: verbal &amp; non–verbal.</td>
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<td>2. Express comprehension and acquisition of speaking &amp; writing ability.</td>
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<td>3. Improve the student confidence in using English language in real life situations.</td>
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<td>4. Develop word power: lexical, grammatical and communication competence.</td>
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<td>5. To prepare the students to write business letters and other forms of technical writing.</td>
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<td>6. Demonstrate the students to prepare for oral communication in formal contexts.</td>
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<td>7.</td>
<td>19BECE241</td>
<td>Mechanics and Mechanics of Solids</td>
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<td>1. Illustrate the vectorial and scalar representation of forces and moments.</td>
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<td>2. Analyse the rigid body in equilibrium.</td>
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<td>3. Evaluate the static forces exerted in rigid body.</td>
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<td>4. Infer the concept of free body diagram.</td>
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<td><strong>8.</strong></td>
<td><strong>19BECS242</strong></td>
<td><strong>Programming For Problem Solving</strong></td>
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<td>The course will enable the students</td>
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<td></td>
<td></td>
<td>1. To formulate simple algorithms for arithmetic and logical problems</td>
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<td>2. To translate the algorithms to programs (in C language)</td>
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<td>3. To test and execute the programs and correct syntax and logical errors</td>
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<td>4. To implement conditional branching, iteration and recursion</td>
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<td>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</td>
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<td>6. To use arrays, pointers and structures to formulate algorithms and programs</td>
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<td>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</td>
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<td>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</td>
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<td><strong>9.</strong></td>
<td><strong>19BECE211</strong></td>
<td><strong>Workshop / Manufacturing Practices Laboratory</strong></td>
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<tr>
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<td></td>
<td>1. The students will gain knowledge of the different manufacturing processes.</td>
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<td>2. To fabricate components using different materials.</td>
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<td>3. Students will be able to fabricate components with their own hands.</td>
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<td>4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances</td>
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<td>5. By assembling different components with different processes.</td>
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<td>6. They will be able to produce small devices of their interest.</td>
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<td><strong>10.</strong></td>
<td><strong>18BECE301</strong></td>
<td><strong>Mathematics – III</strong></td>
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<tr>
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<td></td>
<td>1. Lucid idea about Laplace Transforms.</td>
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<td>2. Different Transform techniques like Z transforms.</td>
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<td>3. The functions which transform a finite set into another finite set which relates to input and output functions in computer science.</td>
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<td>4. Logic sentence express it in terms of predicates, quantifiers, and logical connectives.</td>
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<td>5. To develop the given problem as graph networks and solve with techniques of graph theory.</td>
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<td>6. To develop the fundamentals and basic concepts in Laplace transform, Set Theory and to solve problems related to engineering applications by using these techniques.</td>
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<td><strong>11.</strong></td>
<td><strong>18BECE302</strong></td>
<td><strong>Basic Electronics</strong></td>
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<tr>
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<td></td>
<td>1. Know broadly the concepts and functionalities of the electronic devices, tools and instruments</td>
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<td><strong>2.</strong></td>
<td>Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.</td>
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<tr>
<td><strong>3.</strong></td>
<td>Gain confidence in handling and usage of electronic devices, tools and instruments in engineering applications</td>
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<td><strong>4.</strong></td>
<td>Gain knowledge on the principles and procedure for the analysis of Circuit theory.</td>
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<td><strong>5.</strong></td>
<td>Understand the basic concepts in DC (circuit) and AC (circuit) Fundamentals.</td>
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<td><strong>6.</strong></td>
<td>Understand the basic principles of electromagnetic fields.</td>
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<td><strong>12.</strong></td>
<td><strong>18BECE303</strong> Biology For Engineers</td>
<td><strong>1.</strong> Summarize the cell structures and its functions</td>
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<td><strong>2.</strong> Explain the Biomolecules functions</td>
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<td><strong>3.</strong> Classify the communicable and non-communicable human diseases</td>
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<td><strong>4.</strong> Illustrate the different organ function tests</td>
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<td><strong>5.</strong> Tell the applications of biology in environmental applications.</td>
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<td><strong>6.</strong> Describe the applications of biology in concrete technology.</td>
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<tr>
<td><strong>13.</strong></td>
<td><strong>18BECE304</strong> Energy Science &amp; Engineering</td>
<td><strong>1.</strong> List and generally explain the main sources of energy and their primary applications nationally and internationally.</td>
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<td><strong>2.</strong> Have basic understanding of the energy sources and scientific concepts/principles behind them.</td>
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<td><strong>3.</strong> Understand effect of using these sources on the environment and climate.</td>
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<td><strong>4.</strong> Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.</td>
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<td><strong>5.</strong> List and describe the primary renewable energy resources and technologies.</td>
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<td><strong>6.</strong> To quantify energy demands and make comparisons among energy uses, resources, and technologies.</td>
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<td><strong>14.</strong></td>
<td><strong>18BECE305</strong> Introduction To Civil Engineering</td>
<td><strong>1.</strong> Introduction to what constitutes Civil Engineering.</td>
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<td><strong>2.</strong> Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering.</td>
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<td><strong>3.</strong> Highlighting the depth of engagement possible within each of these areas.</td>
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<td><strong>4.</strong> Exploration of the various possibilities of a career in this field.</td>
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<td><strong>5.</strong> Understanding the vast interfaces this field has with the society at large.</td>
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<td><strong>6.</strong> Providing inspiration for doing creative and innovative work.</td>
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<td><strong>15.</strong></td>
<td><strong>18BECE306</strong> Engineering Mechanics</td>
<td><strong>1.</strong> Use scalar and vector analytical techniques for analysing forces in statically determinate structures.</td>
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<td><strong>2.</strong> Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.</td>
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<td><strong>3.</strong> Apply basic knowledge of maths and physics to solve real-world problems.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Topics</td>
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</table>
2. Enhance their reading texts critically and analytically.  
3. Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument.  
4. Improve their lexical, grammatical and communicative competence.  
5. Will gain knowledge in creative, critical, analytical and evaluative writing.  
6. Enrich the ability to face interviews with confidence. |
| 17. 18BECE311 | Computer-Aided Civil Engineering Drawing | 1. Develop graphical skills for communicating concepts, ideas and designs of engineering products graphically/visually as well as understand another person’s designs, and to get exposure to national standards relating to technical drawings using Computer Aided Design and Drafting practice.  
2. Develop parametric design and the conventions of formal engineering drawing.  
3. Produce and interpret 2D & 3D drawings.  
4. Examine a design critically and with understanding of CAD - The student learns to interpret drawings, and to produce designs using a combination of 2D and 3D software.  
5. Do a detailed study of an engineering artefact.  
6. Develop drawings for conventional structures using practical norms. |
| 18. 17BECE501 | Structural Analysis I | 1. Use various classical methods for analysis of indeterminate structures.  
2. Determine the effect of support settlements for indeterminate structures.  
3. Apply the concepts of ILD and moving loads on determinate structures.  
4. Apply the concept of equivalent UDL.  
5. Determine the reversal of stresses in trusses using ILD.  
6. To Analyse the building using different methods available for designing and analysing. |
2. Use IS code of practice for the design of concrete elements.  
3. Design the beams, slab, stairs, column and footing.  
4. Draw detailing of various RCC structural elements. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>5.</td>
<td></td>
<td>understand the behaviour of columns subjected to eccentric load and use of interaction diagrams</td>
<td>6. gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage</td>
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<tr>
<td>20.</td>
<td>17BECE503</td>
<td>Solid Mechanics II</td>
<td>1. Apply the principle of virtual work.</td>
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<td>2. Determine deflection of a beam for various loading conditions.</td>
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<td>3. Apply unit load method to find the deflection of truss.</td>
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<td>4. Determine different stresses developed in thick cylinders.</td>
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<td>5. Visualize the behaviour of column for combined bending and axial loading.</td>
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<td>6. Determine the deflections if beam using different methods</td>
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<td>21.</td>
<td>17BECE504</td>
<td>Environmental Engineering - I</td>
<td>1. Identify the source of water and water demand.</td>
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<td>2. Apply the water treatment concept and methods.</td>
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<td>3. Apply water distribution processes and operation and maintenance of water supply.</td>
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<td>4. Prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data.</td>
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<td>5. Gain the knowledge of distribution system and their methods.</td>
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<td>6. Understand the design of water supply lines</td>
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<td>22.</td>
<td>17BECE505A</td>
<td>Water Resources Engineering</td>
<td>1. Incorporate the analytical abilities in the planning and design of water resource systems.</td>
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<td>2. Apply the knowledge on reservoir planning and investigation</td>
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<td>3. Design of reservoir, operation and sedimentation</td>
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<td>4. the skills in modelling of flood flows and flood routing</td>
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<td></td>
<td>5. Gained the knowledge about different water structures.</td>
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<td>6. To know about the unit hydrograph and its applications.</td>
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<td></td>
<td>2. Design and principle of illumination, refrigeration principle</td>
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<td></td>
<td>3. Application Various fire safety installations.</td>
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<td>4. Different electrical systems in buildings</td>
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<td>5. Different motors and generators and services used in concrete mixers.</td>
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<td></td>
<td>6. Will gain the knowledge of the refrigerators and its applications.</td>
</tr>
<tr>
<td>24.</td>
<td>17BECE5E006</td>
<td>Foundation Engineering</td>
<td>1. Analyse and design any kind of sheet pile wall system including coffer dam.</td>
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<td>2. Analyse and design well foundation including complete stability analysis.</td>
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<td>3. Estimate soil parameters under dynamic conditions including machine foundations.</td>
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<td>4. Design a suitable foundation system for any kind of problematic soils.</td>
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</table>
5. Analyse the stability of any kind of slope by using both theoretical and graphical methods.
6. Know the fundamentals of soil dynamics and its application to machine foundation analysis including coal provisions.

<table>
<thead>
<tr>
<th>25.</th>
<th>17BECE511</th>
<th>Strength Of Materials Laboratory</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1. Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.</td>
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<tr>
<td></td>
<td>2. Determine the strength of coarse aggregates.</td>
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<td></td>
<td>3. Find the compressive strength of concrete cubes and bricks.</td>
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<td></td>
<td>4. Find stiffness of open coiled and closed coiled springs.</td>
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<td></td>
<td>5. Determine the physical properties of given coarse aggregates, fine aggregates and</td>
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<td></td>
<td>6. Determine the physical properties of given cement samples.</td>
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<thead>
<tr>
<th>26.</th>
<th>17BECE512</th>
<th>Applied Hydraulics &amp; Hydraulic Machinery Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Measure discharge in pipes.</td>
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<td></td>
<td>2. Determine the energy loss in conduits.</td>
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<tr>
<td></td>
<td>3. Demonstrate the characteristics curves of pumps</td>
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<tr>
<td></td>
<td>4. Demonstrate the characteristics curves of turbines.</td>
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<tr>
<td></td>
<td>5. Carry out discharge measurements in open channel.</td>
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<td></td>
<td>6. Brief knowledge of different types of pumps and its applications.</td>
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</table>

| 27. | 16BECC701 | Professional Ethics, Principles Of Management And Entrepreneurship Development |
|------|------------|--------------------------------|----------------------------------|
|      | 1. To familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession |
|      | 2. To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour. |
|      | 3. To give an understanding of Intellectual Property Rights, Patents. |
|      | 4. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession |
|      | 5. To develop good ideas of the legal and practical aspects of their profession |
|      | 6. Gathered ideas of the legal and practical aspects of their profession |

<table>
<thead>
<tr>
<th>28.</th>
<th>16BECE702</th>
<th>Design Of Steel Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Apply the IS code of practice for the design of steel structural elements.</td>
<td></td>
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<tr>
<td></td>
<td>2. Design compression and tension members using simple and built-up sections.</td>
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<tr>
<td></td>
<td>3. Calculate forces on the various members of the truss and design them.</td>
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<td></td>
<td>4. Analyze the behaviour of bolted connections and design them.</td>
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<td></td>
<td>5. Design welded connections for both axial and eccentric forces.</td>
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<td></td>
<td>6. Design components of truss, loads on trusses, analysis and design of purlins and truss members.</td>
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<tr>
<td>No.</td>
<td>Code</td>
<td>Course Title</td>
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</tr>
</tbody>
</table>
| 29  | 16BECE703| Traffic Engineering And Management  | 1. Carry out traffic studies.  
2. Design intersections.  
3. Implement traffic system management.  
4. Be aware of traffic flow theory.  
5. Enhance safety in all design aspects.  
7. The skills of traffic control.       |
| 30  | 16BECE7E07| Remote Sensing Techniques And Applications | 1. Develop fundamental understanding of the GIS and remote sensing technologies.  
2. Understand the basic principles underlying the GIS based management of water resources and environment.  
3. Apply the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.  
4. Understand the types of remotely sensed images and data available for water resource applications.  
5. Develop a project report and can develop Water Resource Information Systems (WRIS) for regional and basin scale.  
6. Understand the basic principles underlying the GIS/model-based management of water resources and environment.       |
| 31  | 16BEECOE02| Consumer Electronics                 | 1. Understand working of various type of loud speakers  
2. Acquire knowledge on various types of picture tubes  
3. Demonstrate the working of various optical recording systems  
4. Distinguish various standards for color TV system  
5. Acquire knowledge on various telecommunication networks  
6. Demonstrate the working of various home appliances |
| 32  | 16BEME0E02| Industrial Safety And Environment    | 1. Recognize and evaluate occupational safety and health hazards in the workplace.  
2. Determine appropriate hazard controls following the hierarchy of controls.  
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.  
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.  
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.  
6. Prevent or mitigate harm or damage to people, property, or the environment.       |
| 33  | 16BECE791| Project Work-Phase I                 | 1. To work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering.  
2. Each student shall finally produce a comprehensive report covering background information, literature |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18BECE401</td>
<td>Introduction To Mechanical Engineering</td>
<td>1. To impart the basic knowledge of various basic fields of mechanical engineering. 2. Gain the basic manufacturing and machining processes. 3. Able to know about basic machining process. 4. Study about the operations of power plants. 5. Know about the automobile engineering. 6. The principles of refrigeration and air-conditioning.</td>
</tr>
<tr>
<td>18BECE402</td>
<td>Engineering Geology</td>
<td>1. Site characterization and how to collect, analyse, and report geologic data using standards in engineering practice. 2. The fundamentals of the engineering properties of Earth materials and fluids. 3. Rock mass characterization and the mechanics of planar rock slides and topples. 4. Soil characterization and the Unified Soil Classification System. 5. The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability. 6. Students are able to identify the different types of formation of earth.</td>
</tr>
<tr>
<td>18BECE404</td>
<td>Introduction To Solid Mechanics</td>
<td>1. Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke’s law relationships; and perform calculations, relative to the strength and stability of structures and mechanical components. 2. Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures; analyze solid mechanics problems using classical methods and energy methods. 3. Analyse various situations involving structural members subjected to combined stresses by application of Mohr’s circle of stress; locate the shear center of thin wall beams. 4. Calculate the deflection at any point on a beam.</td>
</tr>
</tbody>
</table>
subjected to a combination of loads.
5. Solve for stresses and deflections of beams under unsymmetrical loading; apply various failure criteria for general stress states at points.
6. Solve torsion problems in bars and thin walled members.

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</thead>
</table>
| 18BECE441   | Instrumentation & Sensor Technologies For Civil Engineering Applications | 1. To analyze the errors during measurements.  
2. To specify the requirements in the calibration of sensors and instruments.  
3. To describe the noise added during measurements and transmission.  
4. To describe the measurement of electrical variables.  
5. To describe the requirements during the transmission of measured signals.  
6. To construct Instrumentation/Computer Networks. |
| 18BECE442   | Introduction To Fluid Mechanics | 1. Understand the broad principles of fluid statics, kinematics and dynamics.  
2. Understand definitions of the basic terms used in fluid mechanics.  
3. Understand classifications of fluid flow.  
4. Be able to apply the continuity, momentum and energy principles.  
5. Be able to apply dimensional analysis.  
6. Understand the open channel flow, jets, turbines and pumps, dams and spillways, culverts, river. |
| 18BECE443   | Surveying & Geomatics | 1. Students will gain basic knowledge of surveying and unit conversions and its principle.  
2. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities  
3. Translate the knowledge gained for the implementation of Civil infrastructure facilities  
4. Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetric and Remote Sensing.  
5. Able to measure horizontal, vertical, and zenith angles with a transit, theodolite, total station or survey grade GNSS instruments  
6. Able to identify and calculate the errors in measurements |
2. Operate a data acquisition system.  
3. Operate various types of testing machines.  
4. Configure a testing machine to measure tension or compression behaviour.  
5. Compute engineering values (e.g. stress or strain) from laboratory measures.  
6. Analyse a stress versus strain curve for modulus, yield strength and other related attributes. |
<p>| 18BECE451   | Civil Engineering– | 1. The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively. |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Topics</th>
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</thead>
</table>
| 17BECE601   | Structural Analysis II | 1. Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames  
2. Apply the methods of indeterminate truss analysis.  
3. Demonstrate the behaviour of arches and their methods of analysis.  
4. Analyse cable suspension bridges.  
5. Analyse multistorey frames subjected to gravity loads and lateral loads.  
6. Analyse multi storey frames subjected to gravity loads and lateral loads |
| 17BECE602   | Design Of RC Structures II | 1. Apply the concepts of liquid retaining structures.  
2. Design material storage structures using various theories.  
3. Apply the concepts of environmental and transportation structures.  
4. Demonstrate the detailing of reinforcement.  
5. Draw the various RCC structures.  
6. Design of material storage structures. |
| 17BECE603   | Environmental Engineering II | 1. Determine the sewage characteristics and design various sewage treatment plants.  
2. Analyse the status of surface water and groundwater quality and the remediation technologies.  
3. Carry out municipal water and wastewater treatment system design and operation.  
4. Manage hazardous wastes, risk assessment and treatment technologies apply environmental treatment technologies and design process.  
5. study the information about air pollution and its effects.  
6. Gain the information about various sewage treatment processes |
| 17BECE604   | Design Of Steel Structures | 1. Apply the IS code of practice for the design of steel structural elements.  
2. Design compression and tension members using simple and built-up sections.  
3. Calculate forces on the various members of the truss and design them.  
4. Analyse the behaviour of bolted connections and design them.  
5. Design welded connections for both axial and eccentric forces. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 47. 15BECEE008 | Ground Improvement Techniques | 1. Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area.  
2. Capable of providing alternate methods to improve its character suitable to the project, so that the structures built will be stable and serve.  
3. Describe the dewatering systems for different soil conditions and their effect.  
4. Express the working principles of different compaction methods on improving weak deposits.  
5. Express the design of geo textiles reinforcements for ground improvement.  
6. Express the soil stabilization methods for the problematic soils. |
| 48. 15BECEE012 | Repair And Rehabilitation Of Structures | 1. Students must gain knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.  
2. Assessment of distressed structures, repairing of structures and demolition procedures.  
3. Available techniques and their application for strengthening or upgrading existing structural system  
5. Knowledge on various Non-destructive testing.  
6. Different materials used for maintenance of structures. |
| 49. 17BECE611 | Concrete And Highway Laboratory | 1. Determine the strength of coarse aggregates.  
2. Find the compressive strength of concrete cubes and bricks.  
3. Determine the physical properties of given coarse aggregates, fine aggregates and cement samples.  
4. Characterize the aggregate used for road construction  
5. Characterize the bitumen used for road construction.  
6. Know the characteristics, properties and testing procedures of bitumen. |
| 50. 17BECE612 | Environmental Engineering Laboratory | 1. Quantify the pollutant concentration in water, wastewater and ambient air.  
2. Recommend the degree of treatment required for the water and wastewater.  
3. Analyse the survival conditions for the microorganism and its growth rate.  
4. Quantify the water and wastewater pollutant  
5. Measure the concentration of air pollutants  
6. Analyse the characteristics of water |
| 51. 17BECE651 | Irrigation And Environmental Engineering Drawing | 1. Apply the software skills in the design of infrastructure.  
2. Apply computing techniques to transportation engineering. |
3. Apply computing skills to water resources and environmental engineering.
4. Apply computing skills to geotechnical engineering.
5. Learn the software developing skills for structural design.
6. Understand the computing techniques in the field of transportation.

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<tr>
<th>52.</th>
<th>16BECE801</th>
<th>Estimation, Quantity Surveying and Valuation</th>
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<tbody>
<tr>
<td>1.</td>
<td>Apply different types of estimates in different situations.</td>
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<tr>
<td>2.</td>
<td>Carry out analysis of rates and bill preparation at different locations.</td>
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<td>3.</td>
<td>Demonstrate the concepts of specification writing.</td>
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<tr>
<td>4.</td>
<td>Carry out valuation of assets.</td>
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<tr>
<td>5.</td>
<td>The rate analysis and bill preparations</td>
<td></td>
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<tr>
<td>6.</td>
<td>The types of estimates under different conditions</td>
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<tr>
<th>53.</th>
<th>16BEME0E02</th>
<th>Construction Resource Planning And Management</th>
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<tbody>
<tr>
<td>1.</td>
<td>Recognize and evaluate occupational safety and health hazards in the workplace.</td>
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<tr>
<td>2.</td>
<td>Determine appropriate hazard controls following the hierarchy of controls.</td>
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<tr>
<td>3.</td>
<td>Analyse the effects of workplace exposures, injuries and illnesses, fatalities.</td>
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<tr>
<td>4.</td>
<td>Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.</td>
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<tr>
<td>5.</td>
<td>Understand the concept of Industrial Safety &amp; provide useful practical knowledge for workplace safety.</td>
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<tr>
<td>6.</td>
<td>Prevent or mitigate harm or damage to people, property, or the environment.</td>
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<tr>
<th>54.</th>
<th>16BECE891</th>
<th>Project Work-Phase II &amp; Viva Voce</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>To work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering.</td>
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<tr>
<td>2.</td>
<td>Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.</td>
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<tr>
<td>3.</td>
<td>This experience of project work shall help the student in expanding his / her knowledge base.</td>
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<tr>
<td>4.</td>
<td>Will provide opportunity to utilise the creative ability and inference capability.</td>
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<td>5.</td>
<td>Students will gain the presentation skills.</td>
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<tr>
<td>6.</td>
<td>To explain his/her project to the external examiner and can publish the projects in a reputed journal.</td>
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</table>
**Course: B.E. Computer Science**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.     | 19BECS101   | Mathematics I (Calculus and Linear Algebra for Computer Science Engineers) | The students will learn:  
1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.  
2. Fluency in integration using standard methods, including the ability to find an appropriate Method for a given integral.  
3. The essential tools of matrices and linear algebra including linear transformations, Eigenvalues and diagonalization.  
4. To apply differential and integral calculus to notions of curvature and to improper integral and proper integrals.  
5. To solve the system of linear algebraic equations.  
6. To analyze and evaluate the basic concepts of mathematics like matrix operation, vector spaces and calculus. |
| 2.     | 19BECS102   | English                                     | Students undergoing this course will be able to  
1. Describe English language for communication: verbal & non –verbal.  
2. Express comprehension and acquisition of speaking & writing ability.  
3. Improve the student confidence in using English language in real life situations.  
4. Develop word power: lexical, grammatical and communication competence.  
5. To prepare the students to write business letters and other forms of technical writing.  
6. Demonstrate the students to prepare for oral communication in formal contexts. |
| 3.     | 19BECS141   | Semi- Conductor Physics                     | Upon completion of this course, the students will be able to  
1. Develop the idea of quantum mechanics through applications.  
2. Apply the concepts of quantum theory for various methodologies.  
3. Explain the basic ideas of classical electron theory and energy band structures.  
4. Illustrate the basics of semiconductor physics and its applications in various electronic devices.  
5. Identify the basic properties and functioning of optical materials for optoelectronics.  
6. Summarize the features of low dimensional materials for engineering applications. |
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<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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</table>
| 4. | 19BECS142    | Problem Solving Through Programming (With C) | The course will enable the students  
1. To formulate simple algorithms for arithmetic and logical problems  
2. To translate the algorithms to programs (in C language).  
3. To test and execute the programs and correct syntax and logical errors.  
4. To implement conditional branching, iteration and recursion.  
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.  
6. To use arrays, pointers and structures to formulate algorithms and programs.  
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems  
8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration. |
| 5. | 19BECS201    | Probability And Statistics                   | The students will learn:  
1. The ideas of probability, random variables and various discrete and continuous probability distributions and their properties.  
2. The basic ideas of statistics including measures of central tendency, correlation and regression.  
3. The statistical methods of studying data samples.  
4. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.  
5. Understand the concept of the sampling distribution of a statistic, and in particular describe the behavior of the sample mean and hypothesis testing.  
6. To apply problem solving techniques to solve real world events. |
| 6. | 19BECS241    | CHEMISTRY-I                                  | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques  
4. Rationalise bulk properties and processes using thermodynamic considerations.  
5. List major chemical reactions that are used in the synthesis of molecules.  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology. |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Description</th>
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</thead>
</table>
| 7. 19BECS242 | Basic Electrical Engineering                     | 1. To understand and analyse basic electric and magnetic circuits.  
2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.  
3. Attributing the electrical machines and transformer  
4. Evaluate the various digital circuits in real time applications.  
5. Analysis various semiconductor devices in real time applications.  
6. Reproduce the Measuring Instruments and Electrical Installation. |
| 8. 19BECS211 | Workshop / Manufacturing Practices Laboratory    | 1. The students will gain knowledge of the different manufacturing processes.  
2. To fabricate components using different materials.  
3. Students will be able to fabricate components with their own hands.  
4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances  
5. By assembling different components with different processes.  
6. They will be able to produce small devices of their interest. |
| 9. 19BECS212 | Engineering Graphics And Design                  | 1. Introduction to engineering design and its place in society  
2. Exposure to the visual aspects of engineering design and engineering graphics standards  
3. Exposure to engineering communication effectively.  
4. Exposure to 3D free hand sketching.  
5. Acquired the knowledge of projections of points, lines and plane surfaces.  
6. Understand the basic concept of projection of solids. |
| 10. 18BECS301| Mathematics-III (Differential Calculus)         | 1. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.  
2. To understand the ideas of limits and continuity and an ability to calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.  
3. To apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition to change of order and vector integration.  
4. To solve first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.  
5. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications to have basic |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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</thead>
</table>
| 11. 18BECS302 | Environmental Studies                           | 1. Prepare them to go eco-friendly and help preserving the nature and environment.  
2. Educate the means in preserving the environment.  
3. Understand the various types of pollution and environmental status.  
4. Enhance the fundamental knowledge on human welfare measures and sustainable and unsustainable development.  
5. Get an insight on various Social issues and how it effects the environment  
6. Demonstrate a general understanding of the breadth and interdisciplinary nature of environmental issues. |
| 12. 18BECS311 | IT Workshop (SCILAB/ MATLAB)                    | 1. Understand the main features of the SCILAB program development environment to enable their usage in higher learning.  
2. Implement simple mathematical functions/equations in numerical computing environment such as SCILAB.  
3. Interpret and visualize simple mathematical functions and operations thereon using plots/display.  
4. Analyse the program for correctness and determine/estimate/predict the output and verify it under simulation environment using SCILAB tools.  
5. Perform simulation/implementation of various applications.  
6. Good understanding of Linear algebra and Signal processing concepts. |
| 13. 18BECS341 | Analog Electronic Circuits                      | 1. Understand the characteristics of electronic devices including diodes, BJT and MOSFET.  
2. Design and analyse various rectifier and amplifier circuits.  
3. Design sinusoidal and non-sinusoidal oscillators.  
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.  
5. Understand differential, multi-stage and operational amplifiers.  
6. Design and analyse Linear and Nonlinear applications of op-amp. |
| 14. 18BECS342 | Data Structure & Algorithms                     | 1. To analyze the algorithms to determine the time and computation complexity and justify the correctness.  
2. To implement Linear Search and Binary Search.  
3. To construct the Stacks, Queues and linked list student, perform relevant operations and to... |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. 18BECS343</td>
<td>Digital Electronics</td>
<td>1. Understand the characteristics and operations of logic functions and logic gates.</td>
</tr>
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<td>2. Design and implement Combinational and Sequential logic circuits.</td>
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<td>3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.</td>
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<td>4. Understand the functions of semiconductors and memories.</td>
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<td>5. Use PLDs to implement the given logical problem.</td>
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<td>6. Apply the design procedures to design basic sequential circuits.</td>
</tr>
<tr>
<td>16. 18BECS351</td>
<td>PC Hardware Assembly And Troubleshooting</td>
<td>1. Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment.</td>
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<td>2. Communicate effectively and present technical information in oral and written reports.</td>
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<td>3. Apply information technology to a variety of systems including financial, production and manufacturing systems.</td>
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<td>4. Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas in the IT sector.</td>
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<td>5. Describe and analyse current and relevant advances in computer hardware and software.</td>
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<td>6. Analyse system requirements for a variety of computer applications.</td>
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<tr>
<td>17. 17BECS501</td>
<td>Operating Systems</td>
<td>1. Understand device and I/O management functions in operating systems as part of a uniform device abstraction.</td>
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<td></td>
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<td>2. Have an understanding of disk organization and file system structure.</td>
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<td>3. Be able to give the rationale for virtual memory abstractions in operating systems.</td>
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<td>4. Understand the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.</td>
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<td>5. Understand the main mechanisms used for inter-process communication.</td>
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<td>6. Understand the main problems related to concurrency and the different synchronization mechanisms available.</td>
</tr>
</tbody>
</table>
| 18. | 17BECS502 | Computer Networks | 1. To understand the division of network functionalities into layers  
2. To understand the concepts of data communications  
3. To understand the working of router  
4. Able to identify the ports used for transferring and receiving data  
5. Able to identify the flow control mechanism to be adopted in transport layer.  
6. Able to understand the functions of application layer |
| 19. | 17BECS503 | Software Engineering | 1. Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.  
2. Employ group working skills including general organization, planning and time management and inter-group negotiation.  
3. Translate a requirements specification into an implementable design, following a structured and organised process.  
4. Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.  
5. Evaluate the quality of the requirements, analysis and design work done during the module.  
6. Able to back track effectively to improve the current functionalities using appropriate software measures. |
| 20. | 17BECS5E01 | Advanced Data Structures | 1. Solve problems using the procedural, functional and object-oriented programming paradigms.  
2. Relates all binary heap trees to form a large binomial queue for large data structures creation.  
3. Analyse how to balance a binary search tree using rotation methods and colour changing methods.  
4. Solve problems using graph algorithms, including single-source and all-pairs shortest paths, and minimum spanning tree algorithms.  
5. Analyse the time and space complexity of advanced data structures and their supported operations.  
6. Compare the time and space trade-off of different advanced data structures and their common operations. |
| 21. | 17BECS5E07 | Servlets And JSP | 1. Construct and deploy small-to-medium scale web applications found in intranet and low-volume commercial sites by using Java Server Page (JSP page) technology and servlets.  
2. Apply Model-View-Controller (MVC) architecture to projects in EE environments.  
3. Create servlet filters and listeners. |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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</table>
| 17BECS511   | Computer Networks Lab | 1. Understand fundamental underlying principles of computer networking.  
2. Understand details and functionality of layered network architecture.  
3. Apply mathematical foundations to solve computational problems in computer networking.  
4. Understands computer networking concepts and vocabulary.  
5. Understands the concept of protocols.  
6. Utilizing Network tools and simulator. |
| 17BECS512   | Operating Systems Lab | 1. Identify the services provided by operating system.  
2. Able to write programs on Shell Script.  
3. Understand the internal structure of an operating system and be able to write programs.  
4. Understand and solve problems involving key concepts and theories in operating systems.  
5. Able to implement scheduling algorithms.  
6. Able to understand the memory management concepts. |
| 17BECS513   | Case Tools Lab | 1. The students understand the process to be followed in the software development lifecycle.  
2. Find practical solutions to the problems.  
3. Solve specific problems alone or in teams.  
4. Manage a project from beginning to end.  
5. Work independently as well as in teams.  
6. Define, formulate and analyse a problem. |
| 16BECC701   | Professional Ethics, Principles Of Management And Entrepreneurship Development | 1. To Discuss and communicate the management evolution and how it will affect future managers.  
2. Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.  
3. To Practice the process of management's four functions: planning, organizing, leading, and controlling.  
4. To evaluate leadership styles to anticipate the consequences of each leadership style.  
5. To understand the nature of professional responsibility and be able to identify the ethical elements in decisions. |
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>16BECS702</td>
<td>Internet And Web Technology</td>
<td>6. To develop critical thinking skills and professional judgment and understand practical difficulties of bringing about change.</td>
</tr>
<tr>
<td>16BECS7E04</td>
<td>Information Security</td>
<td>1. Demonstrate an understanding of the components of a computer information networked system, 2. To learn about application and software, communication protocols, and networking hardware and software, 3. Create, install and update sophisticated web sites, 4. Install and manage server software and other server-side tools, 5. Demonstrate critical thinking in the understanding, evaluation and application of technology solutions to a variety of real-life situations, 6. Articulate ethical and professional standards as they apply to the use of the computer systems and computer-based data.</td>
</tr>
<tr>
<td>16BESHOE06</td>
<td>Green Chemistry</td>
<td>1. Outline the basic principles of green chemistry (K), 2. Examine the different atom efficient process and synthesis elaborately (S), 3. Apply the concepts combustion of green technology (S), 4. Identify and apply the concepts of renewable energy(S), 5. Apply the concepts of green catalysts in the synthesis (S), 6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)</td>
</tr>
<tr>
<td>16BEECOE02</td>
<td>Consumer Electronics</td>
<td>1. Gain knowledge about various speakers and microphone, 2. Gain knowledge about the fundamental of television systems and standards.</td>
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<tr>
<td>No.</td>
<td>Course Code</td>
<td>Course Title</td>
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</table>
| 30.  | 16BECS711   | Web Technology Lab                    | 1. The students will be able to design Web pages using HTML/XML and style sheets.  
2. Able to use XML to store and forwarding data.  
3. Students will find the ease of implementation of a website and the role of servlets in creating the dynamic websites.  
4. The students will be able to write Client Server applications.  
5. The students will be able to create dynamic web pages using server-side scripting.  
6. Able to create a complete Web Application with all the required modules. |
| 31.  | 18BECS401   | Discrete Mathematics                 | 1. To understand of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.  
2. To apply a given logic sentence and express it in terms of predicates, quantifiers, and logical connectives.  
3. To be exposed to the concepts and properties of algebraic structures such as groups, rings and fields.  
4. To Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.  
5. To develop the given problem as graph networks and solve with techniques of graph theory.  
6. To apply logical reasoning to solve a variety of problems. |
| 32.  | 18BECS402   | Management 1 (Organizational Behavior) | 1. Understand and apply principles of organizational dynamics.  
2. Apply principles relating to systems, culture, structure and change the processes.  
3. Develop critical analytical skills that will help them diagnose situations pertaining to human behaviour.  
4. Generate effective solutions for the same.  
5. Understand performance behaviour at individual and group levels.  
6. Develop the ability to lead and motivate others to succeed. |
| 33.  | 18BECS441   | Computer Organization & Architecture  | 1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.  
2. Write assembly language program for |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Module</th>
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</thead>
<tbody>
<tr>
<td>18BECS442</td>
<td>Operating Systems</td>
<td>1. Understand the different concepts and functions of Operating Systems.</td>
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<tr>
<td></td>
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<td>2. Design various Scheduling algorithms.</td>
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<td>3. Apply the principles of concurrency.</td>
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<td>4. Design deadlock, prevention and avoidance algorithms.</td>
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<td>5. Compare and contrast various memory management schemes.</td>
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<td>6. Design and implement a prototype file system.</td>
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<tr>
<td>18BECS443</td>
<td>Design &amp; analysis Of algorithms</td>
<td>1. Analyze worst-case, average case and the best-case running times of algorithms based on</td>
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<td>asymptotic analysis and justify the correctness of algorithms.</td>
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<td>2. Describe the greedy paradigm and explain when an algorithmic design situation calls for</td>
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<td>it and to develop the greedy algorithms.</td>
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<td>3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation</td>
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<td>calls for it. To synthesize divide-and-conquer algorithms.</td>
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<td>4. Derive and solve recurrence relations</td>
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<td>5. Describe the dynamic-programming paradigm and explain when an algorithmic design situation</td>
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<td>calls for it. For a given problems of dynamic-programming develop the dynamic programming</td>
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<td>algorithms, and analyse it to determine its computational complexity.</td>
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<td>6. To write the effective algorithms to solve engineering problems</td>
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<tr>
<td>18BECS451</td>
<td>Mobile Application Development</td>
<td>1. Ability to install Android in Eclipse.</td>
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<td>2. Understanding of the Android environment to develop projects.</td>
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<td>3. Ability to develop simple Android projects.</td>
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<td>4. Understanding of the android widgets and inclusion of it in projects.</td>
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<td>5. Ability to create android application for playing audio and video files.</td>
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<td>6. Demonstrate their understanding of the fundamentals of Android operating systems.</td>
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<tr>
<td>17BECS601</td>
<td>Compiler Design</td>
<td>1. Build lexical analysers and use them in the construction of parsers.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Description</td>
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| 17BECS602B  | Mobile And Pervasive Computing      | 1. Outline the basic problems, performance requirements of pervasive computing applications.  
2. Understand the trends of pervasive computing and its impacts on future computing applications and society.  
3. Analyze and compare the performance of different data dissemination techniques.  
4. Understand the algorithms for mobile real-time applications.  
5. Analyze the performance of different sensor data management and routing algorithms for sensor networks.  
6. Develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation. |
| 17BECS603  | Artificial Intelligence             | 1. Understand the history, development and various applications of artificial intelligence.  
2. Familiarize with propositional and predicate logic and their roles in logic programming.  
3. Understand the programming language Prolog and write programs in declarative programming style.  
4. Learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems.  
5. Appreciate how uncertainty is being tackled in the knowledge representation and reasoning process, in particular, Interpreted the techniques based on probability theory and possibility theory (fuzzy logic).  
6. Apply concept Natural Language processing to problems leading to understanding of cognitive computing. |
| 17BECS604B | Object Oriented Analysis And Design | 1. Express software design with UML diagrams.  
2. Design software applications using OO concepts.  
3. Identify various scenarios based on software requirements.  
4. Transform UML based software design into pattern-based design using design patterns.  
5. Understand the various testing methodologies for OO software.  
6. To understand the use-case diagrams. |
<p>| 17BECS6E02 | Network Routing Algorithms         | 1. Understand layered architecture and its significance. |</p>
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<td>2. Learn network layer and various routing techniques available.</td>
<td>2. Learn network layer and various routing techniques available.</td>
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<td>3. Apply knowledge for identifying a suitable routing algorithm, implementing it and analysing its performance for any given network and user requirements and the type of channel over which the network has to operate.</td>
<td>3. Apply knowledge for identifying a suitable routing algorithm, implementing it and analysing its performance for any given network and user requirements and the type of channel over which the network has to operate.</td>
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<td>4. Design a new algorithm or modify an existing algorithm to satisfy the evolving demands in the network and by the user applications.</td>
<td>4. Design a new algorithm or modify an existing algorithm to satisfy the evolving demands in the network and by the user applications.</td>
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<td>5. Analyse and implement a proper routing algorithm for defined networks.</td>
<td>5. Analyse and implement a proper routing algorithm for defined networks.</td>
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<tr>
<td>42.</td>
<td>17BECS6E07</td>
<td>Software Project Management</td>
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<td>1. Identify the fundamental issues that a project manager has to consider, and describe, chiefly in the context of software development projects, what approaches exist to manage these issues.</td>
<td>1. Identify the fundamental issues that a project manager has to consider, and describe, chiefly in the context of software development projects, what approaches exist to manage these issues.</td>
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<td>2. Identify and analyze software project activities using contemporary work breakdown techniques.</td>
<td>2. Identify and analyze software project activities using contemporary work breakdown techniques.</td>
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<td>3. Identify and apply selected techniques for estimating the effort and duration of project activities.</td>
<td>3. Identify and apply selected techniques for estimating the effort and duration of project activities.</td>
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<td>4. Construct a schedule of project activities using contemporary planning techniques.</td>
<td>4. Construct a schedule of project activities using contemporary planning techniques.</td>
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<td>5. Construct a quality model for a software development project, including identification of suitable quality attributes, suitable metrics for measuring these, and suitable threshold values for these metrics to indicate acceptable quality.</td>
<td>5. Construct a quality model for a software development project, including identification of suitable quality attributes, suitable metrics for measuring these, and suitable threshold values for these metrics to indicate acceptable quality.</td>
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<td>6. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.</td>
<td>6. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.</td>
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<tr>
<td>43.</td>
<td>16BECS801</td>
<td>Software Testing</td>
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<td>1. Understand complete software testing life cycle.</td>
<td>1. Understand complete software testing life cycle.</td>
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<td>2. Demonstrate understanding of various terms and technologies used in testing domain.</td>
<td>2. Demonstrate understanding of various terms and technologies used in testing domain.</td>
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<td>3. Demonstrate understanding of usage of testing framework, process and test management.</td>
<td>3. Demonstrate understanding of usage of testing framework, process and test management.</td>
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<td>4. Demonstrate understanding of generating test plan and designing test cases.</td>
<td>4. Demonstrate understanding of generating test plan and designing test cases.</td>
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<td>5. Demonstrate understanding of test management process.</td>
<td>5. Demonstrate understanding of test management process.</td>
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<td>6. Given a business scenario, identify and write the test plan, design test cases, document test cases using an open source test management tool.</td>
<td>6. Given a business scenario, identify and write the test plan, design test cases, document test cases using an open source test management tool.</td>
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<tr>
<td>44.</td>
<td>16BECS8E02</td>
<td>E-Commerce</td>
</tr>
<tr>
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<td>1. Demonstrate an understanding of the foundations and importance of E-commerce.</td>
<td>1. Demonstrate an understanding of the foundations and importance of E-commerce.</td>
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<td>2. Describe the infrastructure required for E-commerce.</td>
<td>2. Describe the infrastructure required for E-commerce.</td>
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</table>
3. Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other.
4. Analyze the online threats and strategies for marketing.
5. Discuss legal issues and privacy in E-Commerce.
6. To Know and manage E-Business
**Name of the Department:** Electronics & Communication Engineering

**Course:** B.E. Electronics and Communication Engineering

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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
</table>
| 1.      | 19BEEC101   | Mathematics –I             | 1. Evaluate the limits and continuity of various functions.  
2. Apply various techniques to solve Partial Differential Equations  
3. Find an appropriate method to solve the given integral.  
4. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.  
5. Solve simple standard examples using the ideas of differential equations.  
6. Apply the knowledge acquired to solve various engineering problems. |
| 2.      | 19BEEC102   | English                    | Students undergoing this course will be able to  
1. Describe English language for communication: verbal & non–verbal.  
2. Express comprehension and acquisition of speaking & writing ability.  
3. Improve the student confidence in using English language in real life situations.  
4. Develop word power: lexical, grammatical and communication competence.  
5. To prepare the students to write business letters and other forms of technical writing.  
6. Demonstrate the students to prepare for oral communication in formal contexts. |
| 3.      | 19BEEC141   | Semi- Conductor Physics    | Upon completion of this course, the students will be able to  
1. Develop the idea of quantum mechanics through applications.  
2. Apply the concepts of quantum theory for various methodologies.  
3. Explain the basic ideas of classical electron theory and energy band structures.  
4. Illustrate the basics of semiconductor physics and its applications in various electronic devices.  
5. Identify the basic properties and functioning of optical materials for optoelectronics.  
6. Summarize the features of low dimensional materials for engineering applications. |
| 4.      | 19BEEC142   | Programming For Problem Solving | The course will enable the students  
1. To formulate simple algorithms for arithmetic and logical problems  
2. To translate the algorithms to programs (in C language)  
3. To test and execute the programs and correct syntax and logical errors |
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<td>4.</td>
<td>To implement conditional branching, iteration and recursion</td>
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<tr>
<td>5.</td>
<td>To decompose a problem into functions and synthesize a complete program using divide and conquer approach</td>
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<tr>
<td>6.</td>
<td>To use arrays, pointers and structures to formulate algorithms and programs</td>
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<td>7.</td>
<td>To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</td>
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<td>8.</td>
<td>To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</td>
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<tr>
<td>5.</td>
<td>19BEEC155</td>
<td>Yoga</td>
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<tr>
<td>1.</td>
<td>To enable the student to have physical health and mental health.</td>
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<td>2.</td>
<td>Demonstrate the ability to create and present various yoga activities.</td>
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<tr>
<td>3.</td>
<td>Demonstrate basic skills associated with yoga activities including strength and flexibility, balance and coordination</td>
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<tr>
<td>4.</td>
<td>Asanas enhance muscle strength, coordination, flexibility, agility and range of motion.</td>
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<tr>
<td>5.</td>
<td>Yoga improves posture, increases the intake of oxygen and enhances the functioning of all body systems like respiratory, digestive, endocrine, reproductive, excretory systems etc.</td>
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<tr>
<td>6.</td>
<td>Practicing Yoga ultimately leads towards long-term health and well-being.</td>
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<td>6.</td>
<td>19BEEC201</td>
<td>Mathematics – II</td>
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<tr>
<td>1.</td>
<td>Apply advanced matrix knowledge to engineering problems.</td>
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<tr>
<td>2.</td>
<td>Evaluate line, surface and volume integrals in simple coordinate systems by using Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.</td>
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<tr>
<td>3.</td>
<td>Find the Analytic functions using the Cauchy Riemann equations and discuss how geometric structures are changing under conformal mappings.</td>
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<td>4.</td>
<td>Evaluate complex integrals using the Cauchy’s integral formula and the Residue theorem.</td>
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<td>5.</td>
<td>Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.</td>
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<td>6.</td>
<td>Apply the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in Engineering fields.</td>
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| 7.  | 19BEEC202     | Environmental Studies       | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.  
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners. |
| 8.  | 19BEEC241     | CHEMISTRY-I                 | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques  
4. Rationalise bulk properties and processes using thermodynamic considerations.  
5. List major chemical reactions that are used in the synthesis of molecules.  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology. |
| 9.  | 19BEEC242     | Basic Electrical Engineering| 1. understand and analyse basic electric and magnetic circuits.  
2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.  
3. Attributing the electrical machines and transformer.  
4. Evaluate the various circuits in real time applications.  
5. Analysis various semiconductor devices in real time applications. |
| 6. | Reproduce the Measuring Instruments and Electrical Installation. |
| 7. | understand and analyse basic electric and magnetic circuits. |

| 10. | 19BEEC211 Workshop / Manufacturing Practices Laboratory |
| 1. | The students will gain knowledge of the different manufacturing processes. |
| 2. | To fabricate components using different materials. |
| 3. | Students will be able to fabricate components with their own hands. |
| 4. | They will also get practical knowledge of the dimensional accuracies and dimensional tolerances |
| 5. | By assembling different components with different processes. |
| 6. | They will be able to produce small devices of their interest |

| 11. | 19BEEC212 Engineering Graphics And Design |
| 1. | Introduction to engineering design and its place in society |
| 2. | Exposure to the visual aspects of engineering design and engineering graphics standards |
| 3. | Exposure to solid modelling, computer-aided geometric design, creating working drawings and engineering communication |
| 4. | Exposure to 3D free hand sketching. |
| 5. | Acquired the knowledge of projections of points, lines and plane surfaces. |
| 6. | Understand the basic concept of projection of solids. |

| 12. | 18BEEC301 Linear Algebra And Partial Differential Equations |
| 7. | Analysis of the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts. |
| 8. | Illustrate accurate and efficient use of advanced algebraic techniques. |
| 9. | Demonstrate their expertise by solving non-trivial problems related to the concepts and by proving simple theorems about the statements proven by the text. |
| 10. | Gain the capability to solve various types of partial differential equations. |
| 11. | Ability to clarify engineering problems using Fourier series. |
| 12. | Able to apply the fundamental concepts in their respective engineering fields |

<p>| 13. | 18BEEC302 Electronic Devices |
| 1. | Demonstrate the principle of semiconductor physics |
| 2. | Understand and utilize the mathematical models of semiconductor |
| 3. | Gain knowledge on construction and applications of Diodes |
| 4. | Understand MOS transistors for circuits and systems |
| 5. | Gain knowledge on Construction and working of Field effect Transistors. |</p>
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<th></th>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Details</th>
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</table>
| 14| 18BEEC303   | Digital System Design                      | 1. Design and analyze combinational logic circuits  
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder  
3. Design & analyze synchronous sequential logic circuits  
4. Differentiate different logical families  
5. Gain knowledge about various memory devices and implement using PLDs  
6. Use HDL & appropriate EDA tools for digital logic design and simulation |
| 15| 18BEEC304   | C++ & Data Structures                       | 1. Gain confidence to use a simple Java programming environment, compile programs and interpret compiler errors.  
2. Capable to understand and use the fundamental data types.  
3. Design classes and organize them into packages.  
4. Perceptive of the basic data structures.  
5. Understand the basic search and sort algorithms.  
6. Cultivate the knowledge to use a particular data structure and algorithm to solve a problem |
| 16| 18BEEC305   | Signals And Systems                         | 1. Analyze different types of signals  
2. Represent continuous and discrete systems in time and frequency domain using different transforms  
3. Apply Fourier series and Transforms on signals  
4. Investigate whether the system is stable  
5. Sample and reconstruct a signal  
6. Apply Laplace and Z Transforms on signals |
| 17| 18BEEC306   | Network Theory                              | 1. Understand basics electrical circuits with nodal and mesh analysis.  
2. Describe electrical network theorems.  
3. Apply Fourier series on networks  
4. Interpret Laplace Transform for steady state and transient analysis.  
5. Resolve different network functions.  
6. Understand the frequency domain techniques |
| 18| 18BEEC311   | C++ & Data Structures Laboratory            | 1. Understand the principles of OOP;  
2. Ability to demonstrate good object-oriented programming skills in Java  
3. Understand the capabilities and limitations of Java  
4. Distinguish the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.  
5. Capability to analyze and differentiate |
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<tr>
<td></td>
<td>different algorithms based on their time complexity.</td>
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<td>6. Demonstrate the linked implementation, and its uses both in linear and non-linear data structure.</td>
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<tr>
<td>19.</td>
<td>18BEEC312</td>
<td>Electronic Devices Laboratory</td>
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<tr>
<td></td>
<td>Design various electronic circuits for various configurations and applications</td>
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<td></td>
<td>Design and simulate diverse circuits using simulation software</td>
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<td></td>
<td>Clear idea about the design of rectifiers.</td>
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<td></td>
<td>To divulge the basics of LED with three different wavelengths.</td>
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<td>To make the students familiar with construction series voltage regulator.</td>
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<td>To learn the photo-diode and phototransistor</td>
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<td>20.</td>
<td>18BEEC313</td>
<td>Digital System Design Laboratory</td>
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<tr>
<td></td>
<td>Design various combinational circuits for different application</td>
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<tr>
<td></td>
<td>Implementation of combinational functions using LSI devices</td>
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<td>Construct counter circuits for different application</td>
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<td>Simulate a design using VHD/Verilog HDL</td>
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<td>Design a two-bit magnitude comparator.</td>
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<td>Design and simulate encoder and decoder circuits.</td>
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<td>21.</td>
<td>18BEEC351</td>
<td>PCB Designing</td>
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<td></td>
<td>At the end of this course students will demonstrate the ability to simulate any circuit design using simulation software.</td>
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<td></td>
<td>Able to carry out any PCB design necessary for their graduation projects</td>
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<td>The course is intended to give the students the necessary knowledge and of PCB design steps, starting from a simple schematics, through creating new components, and all the way to down a final PCB layout ready for population.</td>
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<td>Gain good knowledge about PCB design.</td>
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<td>Clear idea about automatic routing and manual routing.</td>
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<td>Understand the basics tools used in PCB.</td>
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<td>22.</td>
<td>17BEEC501</td>
<td>Digital Signal Processing</td>
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<tr>
<td></td>
<td>Apply DFT for the analysis of digital signals &amp; systems</td>
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<td></td>
<td>Design IIR and FIR filters</td>
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<td></td>
<td>Characterize finite Word length effect on filters</td>
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<td></td>
<td>Design the Multirate Filters.</td>
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<td>Apply Adaptive Filters to equalization.</td>
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<td>Apply direct form I and direct form II structures.</td>
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<td>23.</td>
<td>17BEEC502</td>
<td>Digital Communication</td>
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<tr>
<td></td>
<td>Design PCM systems.</td>
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<td>Design and implement base band transmission schemes.</td>
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<td></td>
<td>Design and implement band pass signaling schemes.</td>
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<td>Course Code</td>
<td>Course Name</td>
<td>Topics</td>
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| 17BEEC503  | Antennas And Wave Propagation                    | 1. Explain the various types of antennas and wave propagation.  
2. Write about the radiation from a current element.  
3. Analyze the antenna arrays and special antennas with introduction into CAD modelling.  
4. Determine impedance, gain and efficiency of different antennas  
5. Familiarize with basics of antenna measurement and radiation pattern.  
6. Analyze the structure and mechanism of ionospheric propagation. |
| 17BEEC504  | Microprocessors And Microcontrollers            | 1. Design and implement programs on 8086 microprocessors.  
2. Design and implement programs on 8051 microcontrollers.  
3. Design Memory Interfacing circuits using 8051.  
4. Gain knowledge on ARMv7 processor.  
5. Introduce the CPU timer’s.  
6. To familiarize with Keyboard and stepper motor concepts. |
2. Demonstrate the applications of FFT to DSP.  
3. Implement adaptive filters for various applications of DSP.  
4. Apply DFT for the analysis of digital signals & systems  
5. Design IIR and FIR filters  
6. Characterize finite Word length effect on filters |
2. Demonstrate their knowledge in AM, FM transmission and reception.  
3. Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK.  
4. To divulge the basics of Delta modulation & demodulation.  
5. To familiarize with the basics about Digital modulation & demodulation.  
6. Analyze the fundamentals about AM receiver and FM Receiver. |
| 17BEEC513  | Microprocessor And Microcontroller Laboratory    | 1. Write ALP Programmes for fixed and Floating Point and Arithmetic.  
2. Interface different I/Os with processor.  
3. Execute Programs in 8051.  
4. Design Memory Interfacing circuits using |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>8051</td>
<td></td>
<td>1. Gain knowledge on ARMv7 processor.</td>
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<td></td>
<td>2. Introduce the CPU timer’s.</td>
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<tr>
<td>29.</td>
<td>17BEEC551 Inplant Training</td>
<td>1. Gain knowledge of various tools used in industry</td>
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<td></td>
<td>2. Recent technological advancement happening in current scenario</td>
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<td>3. Capability to acquire and apply fundamental principles of engineering.</td>
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<td>4. Become master in one’s specialized technology</td>
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<td>5. Become updated with all the latest changes in technological world</td>
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<td>6. Knack to be a multi-skilled engineer with good technical knowledge, management,</td>
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<td>leadership and entrepreneurship skills.</td>
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<td>7. Ability to identify, formulate and model problems and find engineering solution</td>
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<td>based on a systems approach.</td>
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<td>8. Capability and enthusiasm for self-improvement through continuous professional</td>
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<td>development and life-long learning.</td>
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<td>30.</td>
<td>16BEEC7E01 Sensors and Transducers</td>
<td>1. Understand basic concepts of various sensors and transducers.</td>
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<tr>
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<td>2. Gain thorough knowledge in selection of suitable sensor based on requirement and</td>
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<td>application.</td>
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<td>3. Familiarize with the basics of thermal sensors.</td>
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<td>4. Understand the concepts of radiation sensors.</td>
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<td>5. Analyze the concepts of medical diagnostic sensors.</td>
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<td>6. Understand the basics of electroanalytical Sensors.</td>
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<td>31.</td>
<td>16BEEC7E02 Computer Hardware And Interfacing</td>
<td>1. Knowledge about issues related to CPU and memory.</td>
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<td></td>
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<td>2. Understand the components of them other board.</td>
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<td>3. Understand different storage media.</td>
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<td>4. Knowledge about the features of different I/O peripherals devices and their edges.</td>
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<td>5. Analyze the fundamentals of IDE drive standard and features.</td>
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<td>6. Understand the Industry standard architecture.</td>
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<td>32.</td>
<td>16BEEC7E03 High Speed Networks</td>
<td>1. Knowledge about ATM and Frame relay.</td>
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<td>2. Knowledge on up-to-date survey of developments in High Speed Networks.</td>
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<td>3. Enable the students to know techniques involved to support real-time traffic and</td>
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<td>congestion control.</td>
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<td>4. Understand different levels of quality of service (Q.S) to different applications.</td>
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<tr>
<th>33.</th>
<th>16BEEC7E04</th>
<th>Nano Electronics</th>
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</table>
|      |             | 1. The students should be able to understand basic and advanced concepts of Nano electronic devices,  
|      |             | 2. Familiarize with sensors and transducers.  
|      |             | 3. Analyze the applications of sensors and transducers in nanotechnology.  
|      |             | 4. Understand the basics about electron wave transistor and electron spin transistor  
|      |             | 5. Analyze the application of Super conducting devices.  
|      |             | 6. Understand the fundamentals of Replacement Technologies |

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<th>34.</th>
<th>18BEEC401</th>
<th>Material Sciences</th>
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</table>
|      |             | 1. Students accumulate the knowledge on the basics of magnetic materials and its applications.  
|      |             | 2. Gain knowledge on the concepts of superconductivity, devices and their applications.  
|      |             | 3. Clarity on the concepts of dielectric properties of materials and their applications in engineering field  
|      |             | 4. Understand the basics of crystals, their structures and different crystal growth techniques.  
|      |             | 5. Clear idea of ceramics, composites and nanomaterials.  
|      |             | 6. Ability to apply the knowledge gained to solve problems in solid state physics using appropriate mathematical formulae. |

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<tr>
<th>35.</th>
<th>18BEEC402</th>
<th>Analog Circuits</th>
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</table>
|      |             | 1. Understand the characteristics of transistors.  
|      |             | 2. Design and analyze high frequency models  
|      |             | 3. Design sinusoidal and non-sinusoidal oscillators  
|      |             | 4. Understand the functioning of OP-AMP and design OP-AMP based circuits.  
|      |             | 5. Design ADC and DAC  
|      |             | 6. Gain good knowledge in various classes of operation of amplifiers. |

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<tr>
<th>36.</th>
<th>18BEEC403</th>
<th>Analog And Digital Communication</th>
</tr>
</thead>
</table>
|      |             | 1. Analyze and tabulate different analog modulation schemes in terms of efficiency and bandwidth.  
|      |             | 2. Analyze the behavior of a communication system in the presence of noise.  
|      |             | 3. Analyze different digital modulation schemes and compute the bit error performance  
|      |             | 4. Investigate pulsed modulation system and analyze the system performance.  
<p>|      |             | 5. Gain knowledge on base band pulse transmission concepts. |</p>
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<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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</thead>
</table>
| 37.    | 18BEEC404   | Microcontroller                                 | 1. Design ALP for different applications for 8085  
2. Write ALP for different applications for 8086  
3. Gain knowledge on advanced processors and controllers  
4. Interface memory and I/O device with controllers  
5. Gain knowledge about architectures of RISC and ARM processors  
6. Distinguish between advanced processors |
| 38.    | 18BEEC405   | Economics For Engineers                         | 1. To apply the basics of economics  
2. Gain knowledge on Value Engineering  
3. To do cost analysis to engineering  
4. To do replacement and Maintenance analysis  
5. Gain knowledge on Depreciation methods  
6. To take economically sound decisions. |
| 39.    | 18BEEC411   | Microcontroller Laboratory                      | 1. Design applications like speed control using advanced controller.  
2. Write program on subroutine.  
3. Interface data converters with microcontrollers.  
4. Program advanced processors.  
5. Write program for design of simple system.  
6. Gain a good knowledge about interfacing with 8259 programmable interrupt controller. |
| 40.    | 18BEEC412   | Analog Circuits Laboratory                      | 1. Design various analogue circuits for various applications  
2. Design and simulate various circuits using simulation software  
3. Analyze the various linear application of op-amp  
4. Design filters to a given frequency  
5. Analyze multivibrator circuits using op-amp  
6. Construct an Instrumentation amplifier for a given gain. |
| 41.    | 18BEEC413   | Analog And Digital Communication Laboratory      | 1. Understand the working of analog modulation techniques.  
2. Knowledge on Multiplexing mechanisms  
3. Construct Pulse modulation and demodulation circuits  
4. Simulate analog and digital modulation using simulation softwares.  
5. Gain knowledge about line coding & decoding.  
6. Understand the delta modulation and demodulation |
| 42.    | 18BEEC451   | Constitution Of India                           | 1. Clarify on functions of the Central government.  
2. Define functions of the State government  
3. Explain the functions of Constitution  
4. Understand and abide the rules of the Indian constitution. |
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<th>Wireless Communication</th>
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<td>5.</td>
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<td>Identify and appreciate different culture among the people.</td>
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<td>6.</td>
<td></td>
<td>Gain knowledge on Indian Society</td>
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<tr>
<td>1.</td>
<td>17BEEC601</td>
<td>Gain adequate knowledge in the fundamentals of cellular radio concepts.</td>
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<td>2.</td>
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<td>Gain adequate knowledge in radio propagation models and modulation techniques.</td>
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<td>3.</td>
<td></td>
<td>Provide ideas about analog modulation techniques used in mobile communication</td>
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<td>4.</td>
<td></td>
<td>Provide the basics about digital modulation techniques used in mobile communication.</td>
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<td>5.</td>
<td></td>
<td>Familiarize with the fundamentals of Multiple Access Techniques.</td>
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<td>6.</td>
<td></td>
<td>Analyze the basics of diversity techniques.</td>
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<th>VLSI Design</th>
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<tbody>
<tr>
<td>1.</td>
<td>17BEEC602A</td>
<td>Explain the basic CMOS circuits and the CMOS process technology.</td>
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<td>2.</td>
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<td>Explain working of various complex gates and logic styles.</td>
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<td>3.</td>
<td></td>
<td>Model the digital system using Hardware Description Language.</td>
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<td>4.</td>
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<td>Acquire the knowledge of procedural assignments conditional statements in VHDL.</td>
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<td>5.</td>
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<td>Understand the concept of mixed language programming</td>
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<td>6.</td>
<td></td>
<td>Ability to write Verilog programmes for digital circuits</td>
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<th>Optical Communication</th>
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<tbody>
<tr>
<td>1.</td>
<td>17BEEC602B</td>
<td>Discuss the various optical fibre modes, configurations and various signal degradation factors associated with optical fibre.</td>
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<td>2.</td>
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<td>Explain the various optical sources and optical detectors and their use in the optical communication system.</td>
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<td>3.</td>
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<td>Analyze the digital transmission and its associated parameters on system performance.</td>
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<td>4.</td>
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<td>Learned the properties of the optical fibres and Connectors.</td>
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<td>5.</td>
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<td>Understand operation of lasers, LEDs, and detectors.</td>
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<th>Microwave Engineering</th>
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<tr>
<td>1.</td>
<td>17BEEC603A</td>
<td>Explain the active &amp; passive microwave devices &amp; components used in Microwave communication systems.</td>
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<td>2.</td>
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<td>Analyze the multi- port RF networks and RF transistor amplifiers.</td>
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<td>3.</td>
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<td>Generate Microwave signals and design microwave amplifiers.</td>
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<td>4.</td>
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<td>Measure and analyze Microwave signal and parameters.</td>
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<td>5.</td>
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<td>Familiarize with the basics of Principle of operation and application of VSWR meter.</td>
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<td>6.</td>
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<td>Understand the concepts of conventional vacuum Triodes.</td>
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<td>8.</td>
<td>Analyze the concepts of high power and Multistage Amplifiers</td>
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</table>
| 47. | 17BEEC603B Embedded Systems | 1. Gain adequate knowledge about devices and buses used for embedded networking.  
2. Gain adequate knowledge about ARMv7 core and ARMCORTEXM4 architecture.  
3. Gain adequate knowledge about Floating Point Unit.  
4. Gain adequate knowledge about Motion Control. Gain knowledge on overview of Operating system  
5. Discuss about task Management  
6. Gain knowledge about semaphore management and message passing. |
| 48. | 17BEEC611A VLSI Design Laboratory | 1. Write HDL code for basic as well as advanced digital integrated circuits.  
2. Import the logic modules into FPGA Boards.  
3. Model the digital system using Hardware Description Language.  
4. Acquire the knowledge of procedural assignments conditional statements in VHDL.  
5. Understand the concept of mixed language programming  
6. Ability to write verilog programmes for digital circuits |
| 49. | 17BEEC611B Optical Communication Laboratory | 1. Analyze the performance of simple optical link.  
2. Analyse the mode characteristics of fibre.  
3. Explain the various optical sources and optical detectors and their use in the optical communication system.  
4. Analyze the digital transmission and its associated parameters on system performance.  
5. Learned the properties of the optical fibres and Connectors.  
6. Understand operation of lasers, LEDs, and detectors. |
| 50. | 17BEEC612A Microwave Engineering Laboratory | 1. Analyse the radiation of pattern of antenna.  
2. Test various microwave components.  
3. Measure and analyze Microwave signal and parameters.  
4. Familiarize with the basics of Principle of operation and application of VSWR meter.  
5. Understand the concepts of conventional vacuum Triodes.  
6. Analyze the concepts of high power and Multistage Amplifiers |
| 51. | 17BEEC612B Embedded System Design Laboratory | 1. Write programs in ARM and PIC microcontroller for a specific Application.  
2. Interface memory and Write programs related to memory operations  
3. Interface A/D and D/A convertors with ARM system. |
<table>
<thead>
<tr>
<th></th>
<th>16BEEC8E01</th>
<th>Artificial Neural Networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Write programmes for interfacing keyboard, display, motor and sensor.</td>
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<tr>
<td>5.</td>
<td>Gain adequate knowledge about Floating Point Unit.</td>
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<tr>
<td>6.</td>
<td>Gain adequate knowledge about Motion Control. Gain knowledge on overview of Operating system</td>
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</table>

| 52. | 16BEEC8E01 |
| Artifical Neural Networks |
| 1. | Gain adequate knowledge about the various architectures of building an ANN and its applications. |
| 2. | Gain adequate knowledge about advanced methods of representing information in ANN like self organizing networks, associative and competitive learning. |
| 3. | Gain adequate knowledge about the architecture of Noncognition. |
| 4. | Analyze an architecture of Noncognition. |
| 5. | Design the self-organizing map-learning algorithm. |

| 53. | 16BEEC8E02 | Virtual Instrumentation Using LabVIEW |
| 1. | The students will be able to familiarize the basic sand need o |
| 2. | The students will be able to learn LabVIEW software basics. |
| 3. | To get better understanding of data acquisition techniques. |
| 4. | The students can have an exposure to different interfacing techniques. |
| 5. | The students can able to design some real time application using LabVIEW software. |
| 6. | Design IIR and FIR filter in Lab view. |

| 54. | 16BEEC8E03 | FPGA Design |
| 1. | Ability to understand FPGA lifecycle. |
| 2. | Understand the concept of selecting a FPGA based on project specifications. |
| 3. | Understand the floor planning, place and route optimization techniques. |
| 4. | Knowledge on lower power reduction techniques to analyze and design FPGA. |
| 5. | Understand the concepts of Power consumption reduction techniques. |
| 6. | Analyze the basics about logical replications |

| 55. | 16BEEC8E04 | ASIC Design |
| 1. | Understand basic knowledge of ASIC internals. |
| 2. | Gain knowledge on types of ASIC. |
| 3. | Gain knowledge about the tools used in ASIC design. |
| 4. | Do Programming with ASIC |
| 5. | Simulate and synthesize any circuit |
| 6. | Perform testing of ASIC |
Name of the Department: **Electrical And Electronics Engineering**

**Course:** B.E. Electrical and Electronics Engineering

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>19BEEE101</td>
<td>Mathematics –I (Calculus and Differential Equations)</td>
<td>The students will learn: 1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions. 2. The tool of power series and Fourier series for learning advanced Engineering Mathematics. 3. To deal with functions of several variables that is essential in most branches of engineering. 4. To find an appropriate method for a given integral and use Green, Gauss and Stokes theorems to simplify calculations of integrals and prove simple results. 5. To understand the ideas of differential equations and facility in solving simple standard examples. 6. To improve facility in algebraic manipulation</td>
</tr>
<tr>
<td>2.</td>
<td>19BEEE102</td>
<td>English</td>
<td>Students undergoing this course will be able to 1. Describe English language for communication: verbal &amp; non –verbal. 2. Express comprehension and acquisition of speaking &amp; writing ability. 3. Improve the student confidence in using English language in real life situations. 4. Develop word power: lexical, grammatical and communication competence. 5. To prepare the students to write business letters and other forms of technical writing. 6. Demonstrate the students to prepare for oral communication in formal contexts.</td>
</tr>
<tr>
<td>3.</td>
<td>19BEEE141</td>
<td>Waves, Optics And Introduction To Quantum Mechanics</td>
<td>Upon completion of this course, the students will be able to 1. Analyse the idea of waves and their types. 2. Extend the basic ideas of wave optics to study interference and diffraction. 3. Introduce the characteristics of laser for engineering applications. 4. Develop the idea of quantum mechanics through applications. 5. Illustrate the basics of conductors, semiconductors and insulators through various models. 6. Apply the knowledge inputs of the course for engineering applications.</td>
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<tr>
<td>4.</td>
<td>19BEEE142</td>
<td>Problem Solving Through Programming (With C)</td>
<td>The course will enable the students 1. To formulate simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs (in C language). 3. To test and execute the programs and correct</td>
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<td>No.</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Description</td>
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</table>
| 5.  | 19BEEE201   | Mathematics – II (Linear Algebra, Transform Calculus and Numerical Method)   | The students will learn:  
1. To solve the problems in engineering using Matrix algebra Techniques.  
2. Derive numerical methods for various mathematical operations and tasks such as interpolation, differentiation and integration.  
3. To analyze and evaluate the accuracy of solution for ordinary differential equations.  
4. To implement numerical methods to solve Partial differential equations.  
5. To solve problems using Laplace Transforms.  
6. To improve facility in numerical manipulation.                                                                                   |
| 6.  | 19BEEE241   | Chemistry-I                                                                   | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques  
4. Rationalise bulk properties and processes using thermodynamic considerations.  
5. List major chemical reactions that are used in the synthesis of molecules.  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology.                           |
| 7.  | 19BEEE242   | Basic Electrical Engineering                                                  | 1. Understand and analyse basic electric and magnetic circuits.  
2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.  
3. Attributing the electrical machines and transformer  
4. Evaluate the various circuits in real time applications.  
5. Analysis various semiconductor devices in real time applications.  
6. Reproduce the Measuring Instruments and Electrical Installation.                                                                 |
| 8.  | 19BEEE211   | Workshop / Manufacturing                                                      | 1. The students will gain knowledge of the different manufacturing processes.  
2. To fabricate components using different materials.                                                                                     |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Practices Laboratory</th>
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</table>
| 19BEEE212   | Engineering Graphics And Design          | 3. Students will be able to fabricate components with their own hands.  
4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances  
5. By assembling different components with different processes.  
6. They will be able to produce small devices of their interest. |
| 18BEEE301   | Electrical Circuit Analysis              | 1. Apply network theorems for the analysis of electrical circuits.  
2. Obtain the solution of first and Second order system  
3. Analyse the electrical circuits using Laplace Transforms.  
4. Obtain the transient and steady-state response of electrical circuits.  
5. Analyse circuits in the sinusoidal steady-state (single-phase and three-phase).  
6. Analyse two port circuit behaviour. |
| 18BEEE302   | Analog Electronics                       | 1. Illustrate the structure, operation and characteristics of PN junction diode and its applications  
2. Understand the characteristics of transistors  
3. Design and analyse various rectifier and amplifier circuits  
4. Illustrate the concepts of various positive and negative feedback amplifiers and derive its parameters  
5. Design sinusoidal and non-sinusoidal oscillators.  
6. Understand the functioning of OP-AMP and design OP-AMP based circuits. |
| 18BEEE301   | Electrical Circuit Analysis              | 1. Understand the concepts of magnetic fields  
2. Understand the concepts of magnetic circuits.  
3. Understand the operation of dc machines.  
4. Analyse the differences in operation of different dc machine configurations.  
5. Analyse the single-phase transformers circuits.  
6. Analyse the three phase transformers circuits. |
| 18BEEE304   | Electromagnetic Fields                   | 1. To understand the basic laws of electromagnetism.  
2. To obtain the electric and magnetic fields for simple configurations under static conditions. |
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<td>3.</td>
<td>To understand the concept of Conductors, Dielectrics and Capacitance.</td>
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<td>4.</td>
<td>To analyse time varying electric and magnetic fields.</td>
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<td>5.</td>
<td>To understand Maxwell’s equation in different forms and different media.</td>
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<td>6.</td>
<td>To understand the propagation of EM waves.</td>
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<td>14.</td>
<td><strong>Engineering Mechanics</strong></td>
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<tr>
<td>1.</td>
<td>Draw free body diagrams and determine the resultant of system of forces.</td>
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<td>2.</td>
<td>Determine the reactions when forces are acting on rigid bodies.</td>
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<td>3.</td>
<td>Determine the centroid and second moment of area of sections.</td>
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<td>4.</td>
<td>Analyze statically determinate planar frames.</td>
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<td>5.</td>
<td>Analyze the motion and determine projectile motion characteristics.</td>
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<td>6.</td>
<td>Apply Newton’s laws and conservation laws to motion of rigid bodies.</td>
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<td>15.</td>
<td><strong>Analog Electronics Lab</strong></td>
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<tr>
<td>1.</td>
<td>Determine the output wave forms of Full Wave Rectifiers with and without filters.</td>
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<td>2.</td>
<td>Draw the equivalent circuit of MOSFET and sketch the V-I characteristics.</td>
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<td>3.</td>
<td>Design the Darlington amplifier and develop the circuit.</td>
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<td>4.</td>
<td>Compare the theoretical and practical frequency response of Wein bridge oscillators.</td>
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<td>5.</td>
<td>Design of a stable and Monostable multivibrators for generation of different waveforms</td>
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<td>6.</td>
<td>Design of clipper and clamper.</td>
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<td>16.</td>
<td><strong>Electrical Machines Lab – I</strong></td>
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<tr>
<td>1.</td>
<td>Analyze the characteristics of DC shunt generator DC compound generator and calculate critical resistance and critical speed</td>
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<td>2.</td>
<td>Examine load characteristics of DC shunt, series and compound motor and identify its maximum efficiency operating point</td>
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<td>3.</td>
<td>Estimate the efficiency of DC machines in different methods</td>
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<td>4.</td>
<td>Sketch the load characteristics of single phase transformer, separate the different losses and find the efficiency</td>
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<td>5.</td>
<td>Predetermine the equivalent circuit parameters of single-phase transformer in two different methods and compare the results</td>
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<td>17.</td>
<td><strong>Power Electronics</strong></td>
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<tr>
<td>1.</td>
<td>Understand the differences between signal level.</td>
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<td>2.</td>
<td>Understand the differences between power level devices.</td>
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<tr>
<td>3.</td>
<td>Analyse controlled rectifier circuits.</td>
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<td>4.</td>
<td>Analyse the operation of DC-DC choppers.</td>
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<td>5.</td>
<td>Analyse the operation of voltage source inverters.</td>
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<td>6.</td>
<td>Understand different modulation techniques.</td>
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<td>18.</td>
<td><strong>Digital Logic Circuits</strong></td>
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<tr>
<td>1.</td>
<td>Use numerical methods to analyse a power system in steady state.</td>
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<td>2.</td>
<td>Understand stability constraints in a synchronous grid.</td>
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| **3.** Understand methods to control the voltage, frequency.  
**4.** Understand methods to control the power flow.  
**5.** Understand the monitoring and control of a power system.  
**6.** Understand the basics of power system economics. | **19.** 17BEEE503 Control System Engineering  
1. To understand the open loop and closed loop (feedback) systems  
2. To understand time domain and frequency domain analysis of control systems required for stability analysis.  
3. To understand the compensation technique that can be used to stabilize control systems  
4. Students can model any physical system in both time domain and frequency domain  
5. Students will be able to analyse the system and determine the stability property of system  
6. Students will be able to determine the controller for any system. | **20.** 17BEEE5E09 Distributed Generation  
1. Understand the distributed generation system, boiler turbine monitoring system.  
2. Understand the Planning of distributed system  
3. Analysis the control of DG inverters  
4. Analysis the protection of distributed systems  
5. Understand the real time system  
6. Analysis the norms and standards used in it. |
| **7.** Understand the monitoring and control of a power system.  
**8.** Understand the basics of power system economics. | **21.** 17BEEE5E12 Sensor And Transducer  
1. Understand all types of sensors and transducers.  
2. Justify the concept and working principle of different transducers and sensors  
3. Justify the transducers that will be utilised in the electrical industries  
4. Identify recent developments in transducer domain  
5. Discover the knowledge for small technology up gradations in it  
6. Analysis the real time application. | **22.** 17BEEE511 Power Electronics Laboratory  
1. The students will be able to demonstrate the all-power semiconductor devices.  
2. To expose students to operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics.  
3. To provide a practical exposure to operating principles, design and synthesis of different power electronic converters.  
4. To introduce students to industrial control of power electronic circuits as well as safe electrical connection and measurement practices.  
5. Able to analyze power electronics circuits  
6. Able to apply power electronic circuits for different loads. |
| **9.** Understand the monitoring and control of a power system.  
**10.** Understand the basics of power system economics. | **23.** 17BEEE512 Analog And Digital Circuits Laboratory  
1. Verification of Logic gates.  
2. Design of digital circuit using logic gates.  
3. Design the code converter. | **   |
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<tr>
<td>6.</td>
<td>Design of timer using 555 IC.</td>
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<tr>
<td>24.</td>
<td>17BEEE513</td>
<td>Control System Engineering Laboratory</td>
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<td></td>
<td></td>
<td>1. Determine the transfer function of DC Shunt Motor.</td>
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<td></td>
<td></td>
<td>2. Ability to find the frequency response of different compensators</td>
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<td>3. Ability to find the step response of P Controller.</td>
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<td>4. Ability to find the step response of PI &amp; PID Controller.</td>
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<td>5. Ability to identify the type of damping from the given Characteristic equation.</td>
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<td>6. Evaluate the speed control of De motor.</td>
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<td>25.</td>
<td>17BEEE552A*</td>
<td>Control And Maintenance For Electrical Motors</td>
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<tr>
<td></td>
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<td>1. Analysis the types of automatic starters for electrical motors.</td>
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<td>2. Analysis control circuits for braking, jogging, reversing operations.</td>
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<td>3. Analysis PLCs circuit for control applications.</td>
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<td>4. Program PLCs for controlling the motors.</td>
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<td>5. Analysis the single phase preventer circuits using PLC</td>
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<td>6. Analysis various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.</td>
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<td>26.</td>
<td>17BEEE552B*</td>
<td>Programmable Logic Controller (Plc)</td>
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<tr>
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<td></td>
<td>1. to understand the registers and functions in PLC and they are able to do the program.</td>
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<td>2. To acquire the knowledge of storage techniques in PLC</td>
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<td>3. Students know how to handle the data and functions</td>
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<td>4. Students known about advanced controller in PLC applications</td>
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<td>5. Students gather real time industrial application of PLC</td>
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<td>6. Students gathered and evaluate the flow charts of ladder and spray process system</td>
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<td>27.</td>
<td>16BECC701</td>
<td>Professional Ethics, Principle of Management and Entrepreneurship Development</td>
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<td>1. Apply ethics in society and realize the responsibilities and rights in the society</td>
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<td>2. Discuss the ethical issues related to engineering</td>
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<td>3. Advanced philosophical knowledge of the profession of recreation and leisure</td>
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<td>4. Synthesis of trends and issues as related to current professional practice</td>
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<td>6. Ethical practice and ethical management</td>
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<td>28.</td>
<td>16BEEE702</td>
<td>Power System Protection and Switchgear</td>
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<tr>
<td></td>
<td></td>
<td>1. Understand the different components of a protection system.</td>
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<td>2. Evaluate fault current due to different types of fault in a network.</td>
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<td>3. Understand the protection schemes for different power system components.</td>
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<td>4. Understand the basic principles of digital protection.</td>
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<td>29.</td>
<td>16BEEE7E05</td>
<td>Power Quality</td>
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<td>5. Understand system protection schemes, and the use of wide-area measurements.</td>
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<td>6. Analysis the Real time application of it.</td>
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<td>1. Evaluate the characteristics of ac transmission</td>
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<td>2. Reproduce the effect of shunt and series reactive compensation.</td>
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<td>3. Justify the working principles of FACTS devices and their operating characteristics.</td>
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<td>4. Reproduce the basic concepts of power quality.</td>
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<td>5. Rewrite the concept of Harmonics</td>
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<td>6. Reproduce and justify the working principles of devices to improve power quality.</td>
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<td>30.</td>
<td>16BECSEO03</td>
<td>PC Hardware And Trouble Shooting</td>
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<tr>
<td></td>
<td></td>
<td>1. Can identify the main components for the PC.</td>
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<td>2. Can Understand about power supplies and the skills to trouble-shoot various power-related problems.</td>
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<td>3. Have an idea about the processor generations used in PCs starting from the first Intel generations to current CPU families. Also, students will familiarize themselves with terms that are directly related to processors such as: caching, multi-threading, Dual-core technology, multi-processing, and pipelining. Computer faults that are related to CPU problems will also be familiar to students.</td>
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<td>4. Familiarize themselves with PC memories such as RAM and ROM devices. This includes RAM types, RAM upgrading, ROM BIOS, and the CMOS chip.</td>
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<td>5. Know about motherboards and the various technologies connected to main boards such as Chipsets, Buses, and various BIOS types. Terms such as PCI, ISA, AGP, MCA, POST, Bootstrap loader, IDE controllers, Regulators, Heat sinks, and others will be familiar to the students.</td>
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<td>6. Learn how to prepare a HDD for storing data, installing Windows OS and various programs. This will be combined with the knowledge about disk technologies and the IDE systems. Students will learn skills such as installing IDE HHDs, high-level Formatting, and HDD partitioning using a variety of tools.</td>
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<td>31.</td>
<td>16BEECOE02</td>
<td>Consumer Electronics</td>
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<td></td>
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<td>1. Gain knowledge about various speakers and microphone</td>
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<td>2. Gain knowledge about the fundamental of television systems and standards</td>
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<td>3. Understand the function and Components of a Remote Control.</td>
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<td>4. Gain knowledge about the process of audio recording and reproduction</td>
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<td>5. Gain knowledge about the various telephone networks.</td>
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<td>6. Gain the knowledge about servicing of Home appliances</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Description</td>
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</table>
2. Understand the Formation of Bus Admittance and Impedance Matrices and Solution of Networks.  
3. Understand the Load Flow  
4. Gain knowledge of symmetrical and unsymmetrical Fault Analysis.  
5. Gain knowledge of Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System  
| 18BEEE401   | Digital Electronics                  | 1. At the end of this course, students will demonstrate the ability to Recall the use of number systems and its conversion and compare the operation, characteristics of digital logic families  
2. Apply the minimal SOP and POS forms of logic expression using K map and implement it with the combinational logic  
3. Analyze and design a synchronous sequential circuit to obtain a state table, state diagram for the time sequence of all the variables  
4. Analyze and design an asynchronous sequential circuit and describe the race conditions, hazards and errors in digital circuits  
5. Understanding the concepts of ROM, RAM and CAM  
6. Understanding the concepts of PLD and CPLD. |
| 18BEEE402   | Electrical Machines – II             | 1. Understand the concept of AC machine windings.  
2. Understand the concepts of rotating magnetic fields.  
3. Understand the operation of ac machines.  
4. Analyse performance characteristics Induction Machines.  
5. To understand the different types of single-phase induction motor based on its starting methods.  
6. Understand the operation of synchronous motor and analyse the performance of motor under different loading and excitation conditions. |
| 18BEEE403   | Power Electronics                   | 1. Understand the differences between signal level.  
2. Understand the differences between power level devices.  
3. Analyse controlled rectifier circuits.  
4. Analyse the operation of DC-DC choppers.  
5. Analyse the operation of voltage source inverters.  
6. Understand different modulation techniques. |
| 18BEEE404   | Signals And Systems                 | 1. Classify different types of signals and systems  
2. Understand the concepts of continuous time and discrete time systems.  
3. Analyse systems in complex frequency domain.  
4. Understand sampling theorem and its implications.  
5. Apply Z transform to solve problems on DT systems |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 18BEEE405   | Mathematics – III (Probability And Statistics) | 1. To apply statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.  
2. To learn the ideas of probability, random variables and various discrete and continuous probability distributions and their properties.  
3. To apply the basic ideas of statistics including measures of central tendency, correlation and regression.  
4. To study statistical methods of the sample data.  
5. To analysis and perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.  
6. To understand the concept of the sampling distribution of a statistic and in particular describes the behaviour of the sample mean and hypothesis testing. |
| 18BEEE406   | Environmental Studies | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.  
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners. |
| 18BEEE411   | Digital Electronics Laboratory | 1. Verify the truth table of Logic Gates and Flip Flops.  
2. Apply Boolean functions to implement adder, subtractor circuits and convert Excess 3 to BCD, Binary to Gray code and vice versa.  
3. Design parity generator, parity checker, encoder and decoder circuits.  
4. Design and implement 4-bit modulo synchronous, Asynchronous counters and implement 4-bit shift registers in SISO, SIPO, PISO, PIPO modes. |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Summary</th>
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</thead>
<tbody>
<tr>
<td>18BEEE412</td>
<td>Power Electronics Laboratory</td>
<td>5. Explain multiplexer, demultiplexer circuits and demonstrate 555 timer in Monostable and a stable operation. 6. Design and demonstrate inverting amplifier, non-inverting amplifier, adder, comparator, integrator and differentiator circuits using Op-Amp.</td>
</tr>
<tr>
<td>18BEEE413</td>
<td>Electrical Machines Laboratory – II</td>
<td>1. The students will be able to demonstrate the all power semiconductor devices. 2. To expose students to operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics. 3. To provide a practical exposure to operating principles, design and synthesis of different power electronic converters. 4. To introduce students to industrial control of power electronic circuits as well as safe electrical connection and measurement practices. 5. Able to analyze power electronics circuits 6. Able to apply power electronic circuits for different loads.</td>
</tr>
<tr>
<td>17BEEE601</td>
<td>Solid State Drives</td>
<td>1. Compare the different indirect testing methods to predetermine the voltage regulation of three phase salient and non-salient pole alternator 2. Determine the positive, negative and zero sequence impedance of alternators 3. Analyze the operation of synchronous motor on infinite bus for different excitation condition 4. Assess the performance of three phase induction motor by conducting direct and indirect testing 5. Assess the performance of single phase induction motor by conducting direct and indirect testing 6. Choose the appropriate induction motor starter for various industrial and commercial applications.</td>
</tr>
<tr>
<td>17BEEE602</td>
<td>Power System Analysis</td>
<td>1. Understand the concepts of power systems. 2. Understand the various power system components. 3. Evaluate fault currents for different types of faults. 4. Understand the generation of over-voltages and insulation coordination. 5. Understand basic protection schemes.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Course Description</td>
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<tr>
<td>44. 17BEEE603A/17BEEE603B</td>
<td>Microprocessor &amp; Microcontroller</td>
<td>1. At the end of this course, students will demonstrate the ability to explain about the architecture of 8051 microprocessor, pin configuration, interrupts and the timing diagram of 8085 2. Develop the assembly language program using mnemonics and corresponding machine code based on architecture of 8051 microprocessor 3. Define the 8051 micro-controller with its architecture, pinouts, memory organization, interrupts and compare the programming concepts with 8051 4. Illustrate the interfacing of 8085 with various peripheral devices for transmission, reception and control of data 5. Make use of the data conversion technique such as ADC and DAC and to interface with 8085 processor and 8051 micro-controller 6. Develop the microcontroller assembly language program for various real time applications</td>
</tr>
<tr>
<td>45. 17BEEE604</td>
<td>Design Of Electrical Apparatus</td>
<td>1. Understand the construction of electrical machines. 2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines 3. Understand the principles of electrical machine design 4. carry out a basic design of an AC and DC machine. 5. Use software tools to do design calculations. 6. Understand performance characteristics of electrical machines.</td>
</tr>
<tr>
<td>46. 17BEEE6E05</td>
<td>High Voltage Engineering</td>
<td>1. To understand the various types of over voltages in power system and Protection methods. 2. To study about generation of over voltages in laboratories. To know about measurement of over voltages. 3. To study about the nature of Breakdown mechanism in solid, liquid and gaseous dielectrics 4. discussion on commercial insulates. 5. To study about testing of power apparatus and insulation coordination</td>
</tr>
<tr>
<td>47. 17BEEE6E10</td>
<td>Biomedical Instrumentation</td>
<td>1. The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance 2. To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration. Methods of different transducers used. 3. To introduce the student to the various sensing and measurement devices of electrical origin.</td>
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<td>No.</td>
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| 48. | 17BEEE611  | Microprocessor And Micro Controller Laboratory | 4. To provide the latest ideas on devices of non-electrical devices.  
5. To bring out the important and modern methods of imaging techniques.  
6. To provide latest knowledge of medical assistance/techniques and therapeutic equipment.  
1. Apply the basic arithmetic and logical operations using 8085 microprocessor with the help of assembly language programming  
2. Analyze the performance of different weighted and non-weighted codes, its conversions with logic diagram using 8085 microprocessor  
3. Illustrate the interfacing of 8085 with various peripheral devices for serial and parallel communication of data  
4. Demonstrate the basic instructions with 8051 microcontroller execution including conditional jumps, looping and calling subroutines  
5. Make use of the basic conversion techniques of ADC and DAC to interface it with 8085 processor and 8051 microcontroller  
6. Develop a model using processor to apply computing platform and software for engineering problems | |
| 49. | 17BEEE612  | Electrical Estimation And Rewinding Laboratory | 1. At the end of the course the students will be able to do wiring and winding for all electrical equipment’s.  
2. To analysis the electrical estimation for residential flat  
3. To analysis the electrical estimation for University building  
4. To analysis the electrical estimation for Primary health centre  
5. To analysis the electrical estimation for Party hall  
6. To analysis the electrical estimation for Saw mill | |
| 50. | 17BEEE651* | PCB Design and Servicing of Domestic Appliances | 1. Techniques of PCBs  
2. PCB Fabrication  
3. Real time application of PCB  
4. PCB component assembly processes  
5. Service to domestic appliances  
6. Installation of domestic appliances | |
| 51. | 16BECC801A | Energy Management, Utilization and Auditing | 1. Understand the concept of Energy Management.  
2. Analyze the different methods for economic analysis  
3. Knowledge about the basic concept of Energy Audit and types.  
4. Evaluate the different energy efficient motors  
5. Understand the concept of Energy conservation.  
6. Investigate the different methods to improve power factor. | |
| 52. | 16BEEE8E03 | Power Generation Systems | 1. At the end of the course the student will gain knowledge about economics of power generation, layout and working of thermal, nuclear and hydropower plants. | |
2. The student also gain knowledge about distributed generation, boiler turbine monitoring system.
3. To get knowledge in Powerplant instrumentation
4. Students acquire knowledge of renewable power system
5. Acquire knowledge about economics in power generation
6. Knowledge in Load demand and factor
Name of the Department: **Food Technology**

**Course:** B.Tech. Food Technology

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<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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</table>
| 1.     | 19BTFT101   | Mathematics – I                           | 1. Evaluate the limits and continuity of various functions.  
2. Apply various techniques to solve Partial Differential Equations  
3. Find an appropriate method to solve the given integral.  
4. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.  
5. Solve simple standard examples using the ideas of differential equations.  
6. Apply the knowledge acquired to solve various engineering problems. |
| 2.     | 19BTFT141   | Chemistry - I                             | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.  
4. Rationalise bulk properties and processes using thermodynamic considerations.  
5. List major chemical reactions that are used in the synthesis of molecules.  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology. |
| 3.     | 19BTFT142   | Basic Electrical Engineering              | 1. understand and analyse basic electric and magnetic circuits.  
2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.  
3. Attributing the electrical machines and transformer.  
4. Evaluate the various circuits in real time applications.  
5. Analysis various semiconductor devices in real time applications.  
6. Reproduce the Measuring Instruments and Electrical Installation. |
| 4.     | 19BTFT111   | Engineering Graphics And Design           | 1. Introduction to engineering design and its place in society  
2. Exposure to the visual aspects of engineering design and engineering graphics standards |
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<th>Course Code</th>
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<th>Course Description</th>
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| 5. 19BTFT201    | Mathematics – II         | 1. Apply advanced matrix knowledge to engineering problems.  
2. Evaluate line, surface and volume integrals in simple coordinate systems by using Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.  
3. Find the Analytic functions using the Cauchy Riemann equations and discuss how geometric structures are changing under conformal mappings.  
4. Evaluate complex integrals using the Cauchy’s integral formula and the Residue theorem.  
5. Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.  
6. Apply the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in Engineering fields. |
| 6. 19BTFT202    | English                  | Students undergoing this course will be able to  
1. Describe English language for communication: verbal & non – verbal.  
2. Express comprehension and acquisition of speaking & writing ability.  
3. Improve the student confidence in using English language in real life situations.  
4. Develop word power: lexical, grammatical and communication competence.  
5. To prepare the students to write business letters and other forms of technical writing.  
6. Demonstrate the students to prepare for oral communication in formal contexts. |
| 7. 19BTFT241    | Engineering Physics      | Upon completion of this course, the students will be able to  
1. Identify the elastic nature of materials.  
2. Infer the concepts of sound waves and its applications through the study of acoustics  
3. Extend the concept of ultrasonics for industrial applications.  
4. Illustrate the thermal properties of materials through various methods.  
5. Infer the characteristics of laser and optical fiber for various engineering applications.  
6. Identify the different atomic arrangements of crystals ad its defects. |
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<th>Description</th>
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| 8. | 19BTFT242   | Programming For Problem Solving                  | The course will enable the students
1. To formulate simple algorithms for arithmetic and logical problems
2. To translate the algorithms to programs (in C language)
3. To test and execute the programs and correct syntax and logical errors
4. To implement conditional branching, iteration and recursion
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach
6. Touse arrays, pointers and structures to formulate algorithms and programs
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems
8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration. |
| 9. | 19BTFT243   | Food Chemistry                                   | 1. Describe the various classifications, properties, applications and analysis of carbohydrates.
2. Summarize the conformations, properties and functional role of proteins
3. Explain the classification, chemistry, sources and applications of lipids
4. Illustrate the structure, types, stability and degradation of important biomolecules.
5. Evaluate the natural and synthetic food colourants, flavors, aromas and other antinutritional components.
6. Demonstrate the use of food composition tables and databases. |
| 10.| 18BTFT301   | Transforms And Partial Differential Equation     | 1. Understand how to solve the given standard partial differential equations.
2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
3. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.
6. The learners can equip themselves in the transform techniques and solve partial differential equations. |
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<th>Course Code</th>
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<th>Course Description</th>
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</table>
| 11. | 18BTFT302 | Fluid Mechanics | 1. Recognize the various properties of fluids.  
2. Assess the pressure differences in fluids.  
3. Apply the different devices to measure the pressure of fluids.  
4. Calculate the forces acting on bodies submerged in different positions in liquids.  
5. Perform the basic design calculations for fluid flow in pipes  
6. Identify the behavior of flow of fluids in pipes. |
| 12. | 18BTFT303 | Food Microbiology | 1. Recognize the general concepts and factors affecting the growth of microorganisms.  
2. Apply the different temperature range as a control agent for food preservation.  
3. Employ the methods include drying, additives and radiation to prevent microbial spoilage.  
4. Use microbial cultures for preparing various fermented food products.  
5. Evaluate the pathogenesis of food borne pathogens and food poisoning.  
6. Assess the bacteriology of water and sanitation measures in food industries |
| 13. | 18BTFT304 | Food Process Calculations | 1. To enumerate the units and dimensions of various physical quantities.  
2. To express the laws and theory of gases and vapours.  
3. To calculate the material balance in food processing units.  
4. To validate the energy balance involved in food processing operations.  
5. Describe the types and properties of fluid flow.  
6. Demonstrate the processes of agitation in fluids |
| 14. | 18BTFT305 | Thermodynamics | 1. Understand the laws, concepts and principles of thermodynamics.  
2. Apply first law of thermodynamics to closed and open systems.  
4. Calculate the thermodynamic properties of pure substances and phase change processes  
5. Discuss the classification, working and accessories of steam boilers.  
6. Understand the working of carnot, vapour compression, vapor absorption and air refrigeration systems. |
| 15. | 18BTFT306 | Food Biochemistry And Human Nutrition | 1. Discuss the digestion, absorption and metabolic pathways of carbohydrates.  
2. Understand the digestion absorption synthesis and metabolism of amino acids and proteins.  
3. Infer the digestion absorption synthesis and metabolism of fatty acids.  
4. Understand the basic principles and overall concepts of food relating to nutrition.  
5. List the diets suitable for managing nutrition related disorder. |
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<tr>
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<th>Outcomes</th>
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<tr>
<td>16. 18BTFT311</td>
<td>Food Microbiology Laboratory</td>
<td>1. Use aseptic technique to properly handle microorganisms to avoid contamination. &lt;br&gt;2. Apply the knowledge to handle microscopes to observe stained microorganisms. &lt;br&gt;3. Enumerate the microorganisms to check the quality characteristics of food. &lt;br&gt;4. Isolate the pure culture from mixed population found in contaminated foods. &lt;br&gt;5. Identify the microorganisms using staining techniques. &lt;br&gt;6. Assess the quality of water and milk.</td>
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<tr>
<td>17. 18BTFT312</td>
<td>Food Biochemistry Lab</td>
<td>1. Examine the protein content of food samples using Lowry’s and Biuret method &lt;br&gt;2. Perform the tests on quantifying carbohydrate content in the food samples. &lt;br&gt;3. Evaluate the amount of ascorbic acid in the given food materials. &lt;br&gt;4. Measure the ash content and sample preparation of the AAS analysis. &lt;br&gt;5. Determine the fat and cholesterol content in the food samples. &lt;br&gt;6. Assess the calculations on protein quality indices.</td>
</tr>
<tr>
<td>18. 18BTFT351</td>
<td>Constitution Of India</td>
<td>1. Understand the functions of the Indian government. &lt;br&gt;2. Understand and abide the rules of the Indian constitution. &lt;br&gt;3. Understand and appreciate different culture among the people. &lt;br&gt;4. Understand the Structure and Functions of Indian constitution &lt;br&gt;5. Understand the Assessment of Parliamentary System in India. &lt;br&gt;6. Understand the Rights of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections</td>
</tr>
<tr>
<td>19. 18BTFT401</td>
<td>Probability And Statistics</td>
<td>1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. &lt;br&gt;2. Understand the basic concepts of one and two dimensional random variables and apply in engineering applications. &lt;br&gt;3. Apply the concept of testing of hypothesis for small and large samples in real life problems. &lt;br&gt;4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control. &lt;br&gt;5. Have the notion of sampling distributions and statistical techniques used in engineering and management problems.</td>
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<td>Course Code</td>
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| 20. 18BTFT402 | Engineering Properties Of Food Materials         | 1. Estimate the physical properties of food materials  
2. Report the frictional properties and storage of agricultural crops  
3. Compare and contrast the Newtonian and non-Newtonian fluids  
4. Express the overall thermal properties of food materials  
5. Measure the aero- and hydrodynamic characteristics and the application of frictional properties in grain handling, processing and conveying.  
6. Demonstrate the dielectric and radiation heating properties of foods |
| 21. 18BTFT403 | Heat And Mass Transfer                           | 1. Express the Conduction mode of heat transfer in simple and composite systems  
2. Evaluate heat transfer coefficients for natural convection.  
3. Discuss the influence of radiation in food processing operations  
4. Analyze heat exchanger performance by using the method of heat exchanger effectiveness  
5. Analyze heat exchanger performance by using the method of log mean temperature difference.  
6. Illustrate the basics of diffusion mass transfer and its application in food Processing. |
| 22. 18BTFT404 | Food Analysis                                    | 1. Test the proximate composition of the given food sample  
2. Determine the physical, chemical and quality standards of lipids, proteins and carbohydrates  
3. Investigate the adulterants in the given food commodities  
4. Examine the composition of foods using spectroscopic methods  
5. Analyze the food materials using chromatographic techniques  
6. Perform the tests on food substances using the principles of electrophoresis, refractometry and polarimetry |
| 23. 18BTFT405 | Unit Operations In Food Processing               | 1. Explain the models involved in the moisture and its measurements.  
2. Investigate the various dryers employed in drying of food.  
3. Demonstrate the filtration, sedimentation and centrifugal separations.  
4. Evaluate the heat transfer coefficients and economy of different types of evaporators.  
5. Estimate the energy and power requirement for the different size reduction operations.  
6. Design and develop the agitators and impellers for mixing operations. |
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</table>
| 24. | 18BTFT406 | Environmental Studies | 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.  
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.  
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. |
| 25. | 18BTFT411 | Food Analysis Laboratory | 1. Test the iodine content in iodized salt  
2. Examine the saponification and iodine value of lipids  
3. Analyze the fat, iron and reducing sugar in the given foods  
4. Evaluate the swelling ratio and extract release of meat  
5. Assess the curcumin and gingerol content in the spices  
6. Calculate the nitrogen content by Kjeldhal analyzer |
| 26. | 18BTFT412 | Fluid Mechanics And Heat Transfer Lab | 1. Calculate the discharge coefficient of fluids at various conditions  
2. Perform the experiment on flow of fluids  
3. Asses the pressure drop across different columns  
4. Demonstrate the heat transfer equipments and their performance.  
5. Measure the efficiency of filtration process  
6. Evaluate the heat transfer through composite wall |
### Course Outcomes

1. Solve the rank, Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices and the students will be able to use matrix algebra techniques for practical applications.
2. Apply differential and integral calculus to notions of evolute and introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering application.
4. Integrate the ideas of limits and continuity and ability to calculate and apply with them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.
5. Analyze differential equations using Fourier series analysis which plays a vital role in engineering applications.
6. Equips students to have basic knowledge and understanding in one field of materials, differential calculus.

### Electromagnetism and Modern Physics

1. Analyze field potentials due to static charges and apply for electrostatic applications.
2. Understand the concepts of magnetic field and apply for electromagnetic applications.
3. Analyze the concepts of advanced physics in quantum theory and its applications in electron microscopes.
4. Integrate the properties on vacuum and its applications in various pumps and gauges.
5. Apply the knowledge inputs of the course for engineering applications.
6. Apply the knowledge inputs of the course for engineering applications.

### Basic Electrical Engineering

1. Understand and analyse basic electric and magnetic circuits.
2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.
3. Attributing the electrical machines and transformer.
4. Evaluate the various circuits in real time applications.
5. Analysis various semiconductor devices in real time applications.
6. Reproduce the Measuring Instruments and Electrical Installation.
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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>4.</td>
<td>19BEME111</td>
<td>Engineering Graphics – I</td>
<td>7. Introduction to engineering design and its place in society</td>
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<td>8. Exposure to the visual aspects of engineering design and engineering graphics standards</td>
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<td>9. Exposure to solid modelling, computer-aided geometric design, creating working drawings</td>
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<td>and engineering communication</td>
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<td>10. Exposure to 3D free hand sketching.</td>
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<td>11. Acquired the knowledge of projections of points, lines and plane surfaces.</td>
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<td>12. Understand the basic concept of projection of solids.</td>
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<tr>
<td>5.</td>
<td>19BEME201</td>
<td>Mathematics II (Calculus, Ordinary Differential Equations and Complex Variable for Mechanical and Automobile Engineering)</td>
<td>The students will learn:</td>
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<td>7. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition to change of order and vector integration.</td>
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<td>8. Analyze first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.</td>
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<td>9. Relate various techniques in solving differential equations and to understand the method of finding the series solution of Bessel’s and Legendre’s differential equations.</td>
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<td>10. Evaluate analytic functions using the Cauchy Riemann equations and they will learn mapping properties of elementary functions and mapping properties of some special transcendental functions. They will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.</td>
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<td>11. Solve complex integrals by using the Cauchy integral formula and the residue theorem and to appreciate how complex methods can be used to prove some important theoretical results.</td>
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<td>12. Explain the fundamentals and basic concepts in vector calculus, ODE, complex functions and problems related to engineering applications by using these techniques.</td>
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<td>6.</td>
<td>19BEME202</td>
<td>English</td>
<td>Students undergoing this course will be able to</td>
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<td>1. Describe English language for communication: verbal &amp; non –verbal.</td>
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<td>2. Express comprehension and acquisition of speaking &amp; writing ability.</td>
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<td>3. Improve the student confidence in using English language in real life situations.</td>
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<td>4. Develop word power: lexical, grammatical and communication competence.</td>
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<td>5. To prepare the students to write business letters and other forms of technical writing.</td>
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<td>6. Demonstrate the students to prepare for oral communication in formal contexts.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Modules</td>
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| 7. 19BEME241 | Chemistry-I                          | 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.  
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.  
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques  
4. Rationalise bulk properties and processes using thermodynamic considerations.  
5. List major chemical reactions that are used in the synthesis of molecules.  
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology. |
| 8. 19BEME242 | Programming For Problem Solving      | The course will enable the students  
1. To formulate simple algorithms for arithmetic and logical problems  
2. To translate the algorithms to programs (in C language)  
3. To test and execute the programs and correct syntax and logical errors  
4. To implement conditional branching, iteration and recursion  
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach  
6. To use arrays, pointers and structures to formulate algorithms and programs  
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems  
8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration. |
| 9. 19BEME211 | Workshop / Manufacturing Practices Laboratory | 1. The students will gain knowledge of the different manufacturing processes.  
2. To fabricate components using different materials.  
3. Students will be able to fabricate components with their own hands.  
4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances  
5. By assembling different components with different processes.  
6. They will be able to produce small devices of their interest. |
| 10. 19BEME212 | Engineering Graphics II             | 1. The students to draw section of solids like Prism, Cylinder, and Pyramid.  
2. Students can prepare true shape of section.  
3. Students gain the knowledge on lateral surfaces. |
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|   |   | 4. Students acquire the knowledge about development of surfaces like Prisms, pyramids, cylinders and cones.  
|   |   | 5. Students gain the knowledge on 2D drawing using CAD software.  
|   |   | 6. Students acquire the knowledge on basics of 3D modelling packages. |
| 11. | 19BEME205 | Constitution of India |
|   |   | Upon completion of the course, students will be able to:  
|   |   | 1. Understand the functions of the Indian government.  
|   |   | 2. Understand the functions of the state government.  
|   |   | 3. Understand the relations between central and state government.  
|   |   | 4. Understand and abide the rules of the Indian constitution.  
|   |   | 5. Understand and appreciate different culture among the people.  
|   |   | 6. Understand the Rights of Women, Children and other Weaker Sections. |
| 12. | 18BEME301 | Mathematics III |
|   |   | 1. The fundamental concepts of partial differential equations and the various solution procedures for solving the first order non-linear partial differential equations.  
|   |   | 2. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.  
|   |   | 3. Understand the basic concepts of one knowledge of the concepts of probability and have knowledge of standard distribution which can describe real life phenomenon.  
|   |   | 4. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.  
|   |   | 5. They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data  
|   |   | 6. Apply the concept of testing of hypothesis for small and large samples in real life problems. |
| 13. | 18BEME302 | Biology For Engineers |
|   |   | 1. Summarize the cell structures and its functions  
|   |   | 2. Explain the Biomolecules functions  
|   |   | 3. Classify the communicable and non-communicable human diseases  
|   |   | 4. Illustrate the different organ function tests  
|   |   | 5. Tell the applications of biology in environmental applications  
|   |   | 6. Describe the concept of biomechanics  
| 14. | 18BEME303 | Engineering Mechanics |
|   |   | 1. Draw free body diagrams and determine the resultant of forces and/or moments.  
<p>|   |   | 2. Determine the centroid and second moment of area of sections. |</p>
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<tr>
<td>3.</td>
<td>Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.</td>
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<td>4.</td>
<td>Analyse statically determinate planar frames.</td>
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<td>5.</td>
<td>Analyse the motion and calculate trajectory characteristics.</td>
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<td>6.</td>
<td>Apply Newton’s laws and conservation laws to elastic collisions and motion of rigid bodies.</td>
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<td><strong>15.</strong></td>
<td><strong>18BEME304</strong></td>
<td>Thermodynamics</td>
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<tr>
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<td>1. Understand the first law and able to differentiate closed and open system, also able to apply first law to both types of systems</td>
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<td>2. Define the physical description of second law and its application to heat engine, refrigerator and heat pump.</td>
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<td>3. Also understand the concepts of entropy and able to find out the entropy generated in a thermodynamic system</td>
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<td>4. Understand the properties of pure substance and ideal gas concepts</td>
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<td>5. Describe the importance of availability concept and able to apply the thermodynamic relations in applications.</td>
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<td>6. Understand the psychrometric properties and various processes to create human comfort at various physical conditions.</td>
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<td><strong>16.</strong></td>
<td><strong>18BEME341</strong></td>
<td>Basic Electronics Engineering (Theory)</td>
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<td></td>
<td></td>
<td>1. Understand the principles of semiconductor devices and their applications.</td>
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<td>2. Understand the concept of voltage regulators</td>
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<td>3. Design an application using Operational amplifier.</td>
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<td>4. Understand the working of timing circuits and oscillators.</td>
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<td>5. Understand logic gates, flip flop as a building block of digital systems.</td>
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<td>6. Learn the basics of Electronic communication system.</td>
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<td><strong>17.</strong></td>
<td><strong>18BEME341</strong></td>
<td>Basic Electronics Engineering (Laboratory)</td>
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<tr>
<td></td>
<td></td>
<td>1. Design amplifiers, oscillators, D-A converters using operational amplifier</td>
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<td>2. Analyze the characteristics of basic electronic devices with various configurations.</td>
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<td>3. Design and Test the digital logic circuits.</td>
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<td>4. Design and Test sequential circuits</td>
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<td>5. Construct multivibrators using 555.</td>
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<td>6. Understand the concept of Flipflop using Logic gates.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Course Description</td>
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</table>
| 18. 17BEME501 | Heat Power Engineering                        | 1. Analyze the performance of various gas power cycles and IC engines.  
2. Understand the working principles of different types of steam generators, mountings and accessories.  
3. Understand the shape of blades, work output of typical turbine stages with its velocity diagram.  
4. Show the difference in working principle and performance of reciprocating and rotary compressors.  
5. Perform the cooling and heating load calculations for a specified application.  
6. Apply the basic thermodynamic concepts in various engineering applications. |
| 19. 17BEME502 | Design Of Machine Elements                    | 1. Determine various types of stresses induced in different machine members.  
2. Design shaft and couplings for effective transmission of power.  
3. Select the type of welded joints and fasteners required for various industrial applications.  
4. Design springs and flywheels for various engineering applications.  
5. Design bearings and levers for engineering applications.  
6. Implement design procedure for designing a machine. |
| 20. 17BEME503 | Dynamics Of Machinery                         | 1. Analyze the static and dynamic forces in various mechanisms.  
2. Determine the rotating masses in dynamic balancing.  
3. Calculate free and forced vibration for practical applications.  
4. Analyze torsional vibrations in mechanical components.  
5. Understand the principles in mechanisms used for speed control and stability control.  
6. Select the type of governors and gyroscopes for different applications. |
| 21. 17BEME5E04 | Hydraulics And Pneumatics Power Control      | 1. Recognize symbols and fundamentals in fluid power generation and distribution.  
2. Identify power source for hydraulic systems.  
3. Select appropriate components used in various hydraulic systems.  
4. Design hydraulic circuits for given applications  
5. Distinguish the components used in pneumatic circuits.  
6. Create the logic circuits for controlling electro-hydraulic/ pneumatic systems. |
| 22. 17BEME5E06 | Renewable Energy Sources                     | 1. Determine the impacts of harnessing different renewable energy.  
2. Analyse and design solar cells so as to improve its performance.  
3. Explain energy generation techniques in wind mills, tide and geo thermal power plant. |
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Objectives</th>
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</table>
| 17BEME511   | Scientific Computing Laboratory            | 4. Understand the technique of harvesting energy from bio mass and bio wastes.  
5. Perform economic analysis for OTEC power plants.  
6. Get basic knowledge on fuel cells, solar cells, thermionic generators etc. |
| 17BEME512   | Dynamics And Metrology Laboratory         | 1. Understand the working of various governors.  
2. Determine of jump speed and profile of the cam.  
3. Determine moment of inertia by oscillation method for connecting rod and flywheel.  
5. Measure taper angle straightness, flatness, surface finfish and thread parameters.  
6. Examine the limits of dimensional tolerances using comparators. |
| 17BEME513   | Thermal Engineering Laboratory I           | 1. Sketch the valve timing diagram for four stroke diesel engine and petrol engines.  
2. Sketch the port timing diagram for single cylinder two stroke diesel engine and petrol engines.  
3. Calculate the mechanical efficiency of four stroke SI engine by Morse test.  
4. Evaluate the performance of four stroke single cylinder CI engine.  
5. Evaluate the performance of steam generator and steam turbines.  
6. Measure the flash and fire point of various fuel/lubricants. |
2. Execute plans by directing and controlling.  
3. Understand the need of Engineering Ethics.  
4. Understand the forces that shape culture.  
5. Show the entrepreneurial skills.  
6. Execute an engineering plan with ethics. |
| 16BEME702   | Mechatronic Systems                       | 1. Implement the concepts of sensors and transducers.  
2. Design the actuation systems.  
3. Understand the architecture of microprocessors.  
4. Create the PLC program using ladder logic. |
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<tr>
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<td>16BEME7E02</td>
<td>Additive Manufacturing</td>
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</table>
|   |   | 1. Understand the need for additive manufacturing technology  
|   |   | 2. Explain the process involved in Additive manufacturing technology  
|   |   | 3. Get knowledge on software’s used in additive manufacturing technology  
|   |   | 4. Describe the working of SLS and other techniques  
|   |   | 5. Apply the additive manufacturing technology in medical field  
|   |   | 6. Applications of additive manufacturing technology in bio stream. |
| 28. | 16BEME7E03 | Composite Materials |
|   |   | 1. Select the various types of composite matrix required for an application.  
|   |   | 2. Choose appropriate manufacturing process for polymer matrix composite.  
|   |   | 3. opt appropriate manufacturing process for metal matrix composite.  
|   |   | 4. Use the concepts of ceramic composites and its production techniques.  
|   |   | 5. Identify the type of carbon-carbon composite for different industrial application.  
|   |   | 6. Explain the various advances in composites. |
| 29. | 16BEME7E04 | Refrigeration And Air Conditioning |
|   |   | 1. Calculate COP of various refrigeration cycles.  
|   |   | 2. Choose appropriate refrigerants for various applications.  
|   |   | 3. Identify the use of unconventional refrigerant system for industrial application.  
|   |   | 4. Calculate the properties of air using psychrometric chart.  
|   |   | 5. Calculate cooling load for a given system  
|   |   | 6. Select the appropriate air conditioning system for industrial and domestic applications. |
| 30. | 16BEAEOE02 | Basics Of Two And Three Wheelers |
|   |   | 1. Understand gyroscopic effect and pendulum effect of two and three wheelers.  
|   |   | 2. Gain the knowledge about power units and ignition systems of 2 stoke and 4 stoke SI engines and CI engines.  
|   |   | 3. Understand the concept in design of gear box and gear change mechanism.  
|   |   | 4. Gain the knowledge about frames and suspension system.  
|   |   | 5. Understand the concept of wheel alignment.  
<p>|   |   | 6. Gain the knowledge about Auto rickshaws, Pick-Ups and delivery type vehicles. |</p>
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<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>16BTAROE01</td>
<td>Non-Destructive Testing</td>
<td>1. Understand the codes, standards and specifications related to NDT</td>
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<td>2. Classify the destructive and non-destructive tests and state their applications</td>
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<td>3. Develop NDT techniques for various products.</td>
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<td>4. Acquire skills needed for selection of appropriate NDT technique(s) for new inspection jobs</td>
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<td>5. Acquire sound knowledge of established NDE techniques and basic familiarity of emerging NDE techniques.</td>
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<td>6. Make use of standards application area of NDET</td>
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<td>16BEME711</td>
<td>CAE / CAM Laboratory</td>
<td>1. Describe the software tools needed to analyze engineering problems.</td>
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<td>2. Describe the different applications of simulation and analysis tools.</td>
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<td>3. Understand the features of CNC Machine Tool.</td>
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<td>4. Prepare part programming for machining a work.</td>
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<td>5. Perform operations in CNC lathe using Siemens.</td>
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<td>6. Perform operations in CNC Vertical Machining Centre using Fanuc.</td>
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<td>16BEME791</td>
<td>Project Work - Phase I</td>
<td>1. Develop the ability to fabrication skill.</td>
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<td>2. Ability to make literature review till the successful solution.</td>
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<td>3. Ability to identify specific problems.</td>
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<td>4. Gain the knowledge about data collection and conducting experiments.</td>
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<td>5. Develop the skill to prepare the project reports</td>
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<td>6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.</td>
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<td>18BEME401</td>
<td>Instrumentation And Control Systems</td>
<td>1. Understand the measurement systems, their accuracy &amp; range.</td>
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<td>2. Measure the quantities like displacement, temperature, pressure</td>
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<td>3. Measure the quantities like level, flow and speed</td>
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<td>4. Measure the quantities like strain, humidity and force</td>
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<td>5. Measure the quantities like torque and power</td>
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<td>6. Classify the various control methods and its application and do system models and perform response analysis</td>
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<td>18BEME402</td>
<td>Environmental Studies</td>
<td>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</td>
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<td>2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.</td>
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<td>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</td>
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<td>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</td>
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| 37. | 18BEME441   | Engineering Materials And Metallurgy (Theory) | 1. Identify the metallurgical aspects of metals.  
2. Identify suitable heat treatment processes for various applications.  
3. Select appropriate ferrous and non-ferrous materials for various applications.  
4. Identify and select suitable non-metallic materials.  
5. Identify suitable strengthening mechanisms for Non-ferrous alloys.  
6. Work with non-destructive testing methods.  |
| 38. | 18BEME441   | Engineering Materials And Metallurgy (Laboratory) | 1. Identify the metallurgical aspects of metals.  
2. Identify suitable heat treatment processes for various applications.  
3. Select appropriate ferrous and non-ferrous materials for various applications.  
4. Identify and select suitable non-metallic materials.  
5. Able to perform corrosion test.  
6. Able to describe a polymer's elastic behaviour above and below the glass transition.  |
| 39. | 18BEME442   | Applied Thermodynamics (Theory)         | 1. Calculate the efficiency of various gas power cycles.  
2. Calculate the performance characteristics of engines.  
3. Analyze combustion mechanism in IC engines.  
4. Evaluate the characteristic of steam turbines and nozzles.  
5. Evaluate the performance characteristics of compressors.  
6. Identify and utilize the concepts of refrigeration and air conditioning in engineering applications.  |
| 40. | 18BEME442   | Applied Thermodynamics (Laboratory)     | 1. conduct experiment on IC engine to study the characteristic and performance of IC Engine  
2. conduct experiment to find the thermo physical properties of given fluid.  
3. Understand the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.  
4. Can formulate power production based on the fundamental laws of thermal engineering.  
5. Understand instil upon to envisage appropriate experiments related to heat engines.  
6. Understand and investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind.  |
| 41. | 18BEME443   | Strength Of Materials (Theory)          | 1. Determine stress and strain on deformation of solids.  
2. Draw the shear force and bending moment diagram for various types of beams.  |
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<th>Course Code</th>
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<th>Topics</th>
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<tr>
<td>3.</td>
<td>Compute safe working stresses and load carrying</td>
<td>3. Compute safe working stresses and load carrying capacity of beams.</td>
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<td></td>
<td>capacity of beams.</td>
<td>4. Estimate the deflection in beams and columns in engineering applications.</td>
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<td>5. Determine principal stresses and analyze thin cylinders and shells subjected to pressure forces.</td>
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<td>6. Analyze the effect of torsion on shafts and springs.</td>
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<td>42.</td>
<td>18BEME443 Strength Of Materials (Laboratory)</td>
<td>1. Ability to perform different destructive testing</td>
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<td>2. Ability to characteristic materials</td>
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<td>3. Understand the stress and strain relationship.</td>
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<td>4. Determine the shear force for various materials.</td>
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<td>5. Determine the impact load for various materials.</td>
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<td>6. Determine the hardness for various materials</td>
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<td>43.</td>
<td>18BEME444 Fluid Mechanics And Fluid Machines</td>
<td>1. Determine fluid properties to solve engineering problems.</td>
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<td></td>
<td>(Theory)</td>
<td>2. Understand the flow characteristics of fluids and its mathematical relations.</td>
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<td>3. Identify fluid behaviours and perform dimensional analysis for fluid flow.</td>
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<td>4. Characterize the fluid flow in a fixed boundary.</td>
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<td>5. Draw velocity vector diagram for hydraulic machines.</td>
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<td>6. Investigate performances of hydraulic machines.</td>
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<tr>
<td>44.</td>
<td>18BEME444 Fluid Mechanics And Fluid Machines</td>
<td>1. Calculate the coefficient of discharge for Orifice meter and Venturimeter.</td>
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<td></td>
<td>(Laboratory)</td>
<td>2. Calibrate the Rotameter</td>
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<td>3. Estimate the friction factor for flow through pipes.</td>
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<td>4. Asses the performance of centrifugal pump and submergible pump.</td>
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<td>5. Asses the performance of reciprocating pump and gear pump.</td>
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<td>6. Asses the performance of turbines.</td>
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<td>45.</td>
<td>17BEME601 Operations Research</td>
<td>1. Formulate and solve engineering and managerial situations as LPP.</td>
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<td>2. Solve Engineering and Managerial situations in Transportation.</td>
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<td>3. Give Engineering and Managerial solutions in Assignment and scheduling problems.</td>
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<td>4. Manage inventory in industry.</td>
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<td>5. Select better sequence to perform operation among various alternatives.</td>
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<td>6. Apply the various tools in various sections of industries like marketing, material handling etc.</td>
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<tr>
<td>46.</td>
<td>17BEME602 Design Of Transmission System</td>
<td>1. Design the power transmission components like belts, pulleys, ropes, chains and sprockets.</td>
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<td>2. Design spurs and parallel axis helical gears.</td>
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<td>3. Estimate the dimensions for bevel and worm gears.</td>
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<td>4. Practice the design procedures of gear boxes for industrial applications.</td>
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<td>5. Design clutches and brakes for engineering applications.</td>
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<td>6. Design a mechanical system</td>
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<td>Course</td>
<td>Course Code</td>
<td>Subject</td>
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</tbody>
</table>
| 47.      | 17BEME603   | Heat And Mass Transfer                      | 1. Determine the rate of heat transfer for conduction.  
2. Evaluate heat transfer coefficients for natural and forced convection for different fluid flows.  
4. Estimate the radiation heat transfer between the surfaces.  
5. Calculate the coefficient of mass transfer.  
6. Solve complex problems where heat and mass transfer take place |
| 48.      | 17BEME604   | Economics For Engineers                     | 1. Evaluate the economic theories, cost concepts and pricing policies.  
2. Understand the market structures and integration concepts  
3. Understand the measures of national income, the functions of banks and concepts of globalization  
4. Apply the concepts of financial management for project appraisal  
5. Understand accounting systems and analyze financial statements using ratio analysis  
6. Understand the impact of inflation, taxation, depreciation. Financial planning, economic basis for replacement, project scheduling, and legal and regulatory issues are introduced and applied to economic investment and project-management problems |
| 49.      | 17BEME6E01  | Power Plant Engineering                     | 1. Select the accessories and layout required for a steam power plant depending upon the requirements.  
2. Compute performance of steam power plant.  
3. Explain the working of nuclear and hydel power plant.  
5. Calculate the economics of the power plant.  
6. Apply appropriate type of renewable energy technologies depending upon the application and availability. |
| 50.      | 17BEME6E02  | Advanced Manufacturing Processes            | 1. Understand the concepts and processing parameters of powder metallurgy process  
2. Different kinds of metal joining processes.  
3. Explain various sheet metal making processes  
4. Summarize various hot working and cold working methods of metals  
5. Describe the constructional and operational features of modern machining process  
6. Understand the importance of rapid prototyping in the product development |
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 51. 17BEME6E05 | Design For Manufacture And Assembly | 1. Understand the importance of DFMA in industrial scenario  
2. Implement the tolerances analysis.  
3. Identify different types of tolerance allocation methods.  
4. Practice the geometric dimensioning and tolerance concepts.  
5. Prepare tolerance chart.  
6. Implement DFM concepts in practice. |
| 52. 17BEME6E07 | Advanced I C Engines | 1. Explain the construction and operation of internal combustion engine.  
2. Identify parts, terminology and fuel supply system of internal combustion engine.  
3. Recognize the component used in cooling and lubrication systems of IC engines.  
4. Describe the function of combustion, knocking and super charging of internal combustion engines.  
5. Implement strategies for pollution control.  
6. Know about the recent trends associated with IC engines |
| 53. 17BEME611 | Computer Aided Design And Simulation Laboratory | 1. Use computer and CAD software's for modeling of mechanical components  
2. Use various options in SolidWorks for modeling of given components  
3. Create assembly of components  
4. Prepare manufacturing drawings from the models created  
5. Use MAT Lab for simulating different systems like hydraulic and pneumatic circuits  
6. Use mat lab for performing various mathematical operations |
| 54. 17BEME612 | Thermal Engineering Laboratory II | 1. Conduct a test to find thermal conductivity of various engineering materials.  
2. Measure heat transfer rate in free and forced convection environment.  
3. Measure emissivity of grey surface.  
4. Determine Stefan–Boltzmann constant.  
5. Measure the effectiveness of parallel and counter flow heat exchanger.  
6. Measure COP of refrigeration and air conditioning system and performance of air compressor and fluidized bed cooling tower. |
| 55. 17BEME613 | Mini Project | 1. Develop the ability to fabrication skill.  
2. Ability to make literature review till the successful solution.  
3. Ability to identify specific problems.  
4. Gain the knowledge about data collection and conducting experiments.  
5. Develop the skill to prepare the project reports  
6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination. |
| 56. 16BEME801 | Total Quality Management | 1. Understand the essentiality of quality.  
2. Summarize various TQM principles. |
<table>
<thead>
<tr>
<th>3.</th>
<th>Understand the various TQM principles.</th>
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<tbody>
<tr>
<td>4.</td>
<td>Understand the techniques for quality management.</td>
</tr>
<tr>
<td>5.</td>
<td>Implement standard quality systems in industries.</td>
</tr>
<tr>
<td>6.</td>
<td>Apply various techniques to improve the quality in industries.</td>
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<tr>
<th>57.</th>
<th>16BEME8E01 Quality Control And Reliability Engineering</th>
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<tbody>
<tr>
<td>1.</td>
<td>Summarize the concept of Quality</td>
</tr>
<tr>
<td>2.</td>
<td>Apply Process control for variables</td>
</tr>
<tr>
<td>3.</td>
<td>Apply the process control for attributes</td>
</tr>
<tr>
<td>4.</td>
<td>Explain the concept of sampling and to solve problems</td>
</tr>
<tr>
<td>5.</td>
<td>Explain the concept of Life testing</td>
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<tr>
<td>6.</td>
<td>Explain the concept Reliability and techniques involved</td>
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</tbody>
</table>

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<thead>
<tr>
<th>58.</th>
<th>16BEME8E02 Production Planning And Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Indicate the need for planning and control in various aspects.</td>
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<tr>
<td>2.</td>
<td>Understand various work study methodologies.</td>
</tr>
<tr>
<td>3.</td>
<td>Construct product and process plan.</td>
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<td>4.</td>
<td>Prepare a production schedule based on different facets.</td>
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<tr>
<td>5.</td>
<td>Estimate the level of inventory</td>
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<tr>
<td>6.</td>
<td>Understand the recent advancements in production planning and control.</td>
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</table>

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<tr>
<th>59.</th>
<th>16BEME8E03 Cogeneration And Waste Heat Recovery Systems</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Understand the various methods of cogeneration.</td>
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<tr>
<td>2.</td>
<td>Apply knowledge of thermodynamics, heat transfer, and fluid Mechanics principles to design and analysis of this emerging technology.</td>
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<tr>
<td>3.</td>
<td>Have thorough understanding, operational issues and challenges cogeneration technologies.</td>
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<tr>
<td>4.</td>
<td>Understand the impact of this technology in waste heat recovery systems</td>
</tr>
<tr>
<td>5.</td>
<td>Get the knowledge over various systems involved in waste heat recovery process</td>
</tr>
<tr>
<td>6.</td>
<td>Begin a career as an engineer in an organization economic analysis</td>
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<tr>
<th>60.</th>
<th>16BEME891 Project Work - Phase II and Viva – Voce</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Develop the ability to fabrication skill.</td>
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<tr>
<td>2.</td>
<td>Ability to make literature review till the successful solution.</td>
</tr>
<tr>
<td>3.</td>
<td>Ability to identify specific problems.</td>
</tr>
<tr>
<td>4.</td>
<td>Gain the knowledge about data collection and conducting experiments.</td>
</tr>
<tr>
<td>5.</td>
<td>Develop the skill to prepare the project reports</td>
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<tr>
<td>6.</td>
<td>Develop the skill to prepare power point presentation and to face reviews and viva voce examination.</td>
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</tbody>
</table>
Name of the Department : **Faculty of Architecture**

**Course** : B. Arch.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
</tr>
</thead>
</table>
| 1      | 19ART101    | History Of Architecture I | 1. An understanding about the spatial and stylistic qualities associated with architecture.  
2. An understanding of the diversity of architecture in India.  
3. An understanding to appreciate particular culture, symbolic, spatial and material qualities.  
4. An understanding about architecture and cities as givers of meaning and continuity.  
5. An Understanding about the Dravidian Style by case studies.  
6. An Understanding about the West Asian Architecture by case studies. |
| 2      | 19ART102    | Mathematics In Architecture | 1. Student will be trained on the basis of the topics of Mathematics necessary for effective understanding of architecture subjects.  
2. Students will understand the advanced level applications by using coordinate geometry  
3. Students will understand the Statistical charts and variance for applications in architecture  
4. Students will develop the skill and understating of Area & volume calculations for Applications in Architectural design  
5. Students will understand the historical applications of mathematics and use of it in current context  
6. Student would have an understanding of the basics of parametric design concept in architecture |
| 3      | 19ART103    | Environmental Studies | 1. Student will be able to master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.  
2. Student will master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.  
3. Student will know to appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.  
4. Student will able to relate the environmental studies to the city planning strategies and Architecture  
5. Student will be able to understand about the biodiversity and the conservation techniques  
6. Student will be able to know methods to mitigate pollution |
| 4      | 19ARP111    | Art Appreciation And Model Making | 1. Student will understand the vocabulary of art and form principles  
2. Student will understand to appreciate the art forms and analyse and apply the concept in architecture  
3. Student will gain mastery in sketching, visualizing and expression through manual drawing, sensitized to culture, craft and context. |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Student Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 19ARS121</td>
<td>Architecture I Design - I</td>
<td>1. Student will understand the qualities of different elements as well as their composite fusions.</td>
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<td></td>
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<td>2. Student will be able to engage and combine the elements of design in spontaneous as well as intentional ways in order to create desired qualities and effects.</td>
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<td>3. Student will develop these required skills – observation/analysis/abstractions/interpretation/representations/expressions through models and drawings.</td>
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<td>4. Student will be able to develop the confidence to communicate effectively by explaining their own design product.</td>
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<td>5. Student will develop the art of Design Communication through his expression.</td>
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<td>6. Student will understand with whole design process from the concept to the final product.</td>
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<tr>
<td>6 19ARS122</td>
<td>Building Materials</td>
<td>1. Students will learn about the properties of various building materials</td>
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<tr>
<td></td>
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<td>2. Students will understand the properties of stone, brick and its usage through drawing.</td>
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<td>3. Student will be able to recognize the apt usage of materials through proper research.</td>
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<td>4. Students will be able to understand and submit drawing plates comprising of technical plan, elevation and section along with sketches and details.</td>
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<td>5. Student will be able to understand the technical details and construction details of the subject</td>
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<td>6. Students will gain knowledge in cost and availability by their field Survey and Site visits.</td>
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<tr>
<td>7 19ARS123</td>
<td>Architectural Graphics</td>
<td>1. Student will be able to understand the 2 dimensional &amp; the 3 dimensional perspective of the objects</td>
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<td>2. Student will be able to construct the 3d views and perspective drawings of the buildings.</td>
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<td>3. Student will be able to draw the perspective drawings with sciography.</td>
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<td>4. Student will be able to do Architectural Rendering</td>
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<td>5. Student will be able to do architectural detailed drawing for a smaller scale project.</td>
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<td>6. Student will be able to do read and Do a technical Architectural Drawing</td>
</tr>
<tr>
<td>8 18ART301</td>
<td>History Of Architecture - III</td>
<td>1. Student will understand the various Architecture features and its outcome due to various social, political and economic upheavals, and its response to the cultural and context.</td>
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<tr>
<td></td>
<td></td>
<td>2. Student will understand about the spatial and stylistic qualities associated with Dravidian architecture.</td>
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<td>3. Student will understand about the spatial and stylistic qualities associated with Buddhist architecture.</td>
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<td>4. Student will understand about the spatial and stylistic qualities associated with Islamic architecture.</td>
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</table>
| 5. | Student will understand the Styles and Details of Mughal Architecture  
6. | Student will expertise in Spatial understanding of historical places by Sketching & reading.  
| 9 | 18ART302 | Mechanics Of Structures-II  
1. | Student will understand the concepts of action of forces like bending moment and shear force  
2. | Student will understand the basic geometric properties and the behavior of beams under effect of stress  
3. | Student will understand the various structural components of the building like columns  
4. | Student will understand about the Reinforced structures structural system and ability  
5. | Student will understand about Indeterminate Structures in Architectural Design  
6. | Student will be able to relate various building structural components and their behavior  
| 10 | 18ARP311 | Computer Application-II  
1. | Student will be able to understand the use of digital tools in the realm of visual composition.  
2. | Student will understand the drafting & Details through Software.  
3. | Student will develop the skill of 3D visualization and rendering.  
4. | Student will understand the concept of BIM- building information modelling through the specific software  
5. | Student will gain the Skill of Multimedia & video making presentations required for Architectural practice  
6. | Student will gain knowledge about the latest developments of digital applications in Architecture.  
| 11 | 18ARP312 | Surveying, Levelling & Site Planning  
1. | Student will understand the various systems of Surveying  
2. | Student understand the concept of levelling and its applications on site for various types of buildings.  
3. | Student will understand about the larger survey context using the total station and GIS mapping  
4. | Student will understand about the Site Inventory and Site analysis  
5. | Student will learn about Hill survey and method of Contouring  
6. | Student will learn about the item planning principles, methods and its applications in architectural design.  
| 12 | 18ARS321 | Architectural Design-III  
1. | Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.  
2. | Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project  
3. | Student will be able to transform the theoretical ideas to the tangible output of design.  
4. | Student will be able to understand the space organization, space- volume design approach  
5. | Student will be able to research, Analyse and Deliver the Architectural Design.  
6. | Student will be able to Communicate effectively through the design ideas  
| 13 | 18ARS322 | Building Materials  
1. | Student will learn about the concrete as a versatile material in different contexts.  

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Student Outcomes</th>
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</table>
| And Construction - III | 2. Student will understand the concepts of concrete as a building construction material.  
3. Student will be able to design and detail specific components in concrete in Architectural Design  
4. Student will understand about concrete Footing, column by doing detailed drawings  
5. Student will understand about concrete Slab, beams by doing detailed drawings  
6. Student will understand about concrete Plinth, lintel, Sill by doing detailed drawings  
7. Student will understand about concrete Staircase by doing detailed drawings |  
| 14 18ARS323 Building Services - I | 1. Student will understand about Building services and its integration in a building  
2. Student will learn about water supply, sewage, drainage and waste systems in buildings.  
3. Student will learn about the various electrical systems and applications in building  
4. Student will understand about Heating, ventilation and air-conditioning systems in a building.  
5. Student will learn about the Fire safety & Services in a building  
6. Student will understand the importance of application of services in a building. |  
| 15 17ART501 Contemoraay Architecture -II | 1. Student will learn about the spread and varied later directions of modern architecture across the world.  
2. Student will become familiar with contemporary forces and directions in architecture across the world and in India  
3. Student will understand about the post-independence architecture in India contemporaneous with the rest of the world, along with its own particular influences.  
4. Student will understand about the Post- independence revolution of design in India  
5. Student will know about the Alternate practices  
6. Student will gain knowledge in recent trends of Architecture & Design |  
| 16 17ART502 Design Of Structures-II | 1. Students will get introduced to the material properties of steel and concrete  
2. An understanding of the different concepts in designing footings and columns and masonry walls using LSD methods.  
3. An understanding of the concepts in limit state design  
4. An understanding of how to use of limit state design for the analysis and design of columns  
5. An understanding of design of structural elements like footings, retaining walls and masonry walls  
6. An understanding of how to use limit state design for design of staircases |  
| 17 17ARP511 Computer Application-IV | 1. Ability to express using digital tools in the realm of visual composition, drafting, 3D visualisation and rendering  
2. Student will understand the drafting & Details through Software  
3. Student will develop the skill of 3D visualization and rendering  
4. Student will understand the concept of BIM- building information modelling through the specific software |  

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<tr>
<th>Code</th>
<th>Subject</th>
<th>Session</th>
<th>Details</th>
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<tbody>
<tr>
<td>18</td>
<td>17ARS521 Architectural Design -V</td>
<td>1</td>
<td>1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.</td>
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<td>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</td>
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<td>3. Student will be able to transform the theoretical ideas to the tangible output of design.</td>
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<td>4. Student will be able to understand the space organization, space-volume design approach in large scale projects</td>
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<td>5. Student will be able to research, Analyse and Deliver a Mixed-use Architectural Design.</td>
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<td>6. Student will be able to Communicate effectively through the design ideas.</td>
</tr>
<tr>
<td>19</td>
<td>17ARS522 Building Materials And Construction -V</td>
<td>1</td>
<td>1. Student will learn about the Composition, manufacturing method, treatment, properties and uses of glass</td>
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<td>2. Student will learn about Plastic building products</td>
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<td>3. Student will learn about Timber floors, build in furnitures, interior details</td>
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<td>4. Student will gain Knowledge of glass, plastics, paints and finishes in building construction.</td>
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<td>5. Student will become familiar with Secondary Building products – windows, doors, sky light domers</td>
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<td>6. Student will gain knowledge about Smart Materials: Characteristics, classification, properties, energy behaviour, intelligent environments.</td>
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<tr>
<td>20</td>
<td>17ARET53 Landscape Architecture</td>
<td>1</td>
<td>1. Student will understand the role of landscape design with respect to macro scale of sustainability and ecology</td>
</tr>
<tr>
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<td>2. Student will understand the micro scale of shaping of outdoor environments.</td>
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<td>3. Student will gain Knowledge about the elements of landscape design and their scope.</td>
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<td>4. Student will know about the Sensitivity towards evolution of different garden and landscape design across time and context.</td>
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<td>5. Student will understand the historical method of landscape design</td>
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<td>6. Student will understand the urban scale landscape design.</td>
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<td>7. Student will be able to do landscape design with respect to site planning and different functional typologies of spaces</td>
</tr>
<tr>
<td>21</td>
<td>17ARET53 Structures In Architecture</td>
<td>1</td>
<td>1. Familiarity with concepts of structural design and its influence on the functional and aesthetic domains of architectural design relating to historic periods.</td>
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<td>2. Students will gain knowledge about structural systems in pre and post industrial era</td>
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<td>3. Students will gain familiarity about structural concepts in contemporary period</td>
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<td>4. Familiarity with the works of famous architects and engineers in the structural front</td>
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<td>5. Gain knowledge on performing case studies on structurally relevant buildings.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>6. Student will understand the theoretical concepts of acoustics</td>
<td>1. Student will understand the theoretical ideas and concepts sound transmission and absorption</td>
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<tr>
<td>17ARET533</td>
<td>Acoustics</td>
<td>2. Student will understand the theoretical concepts of acoustics</td>
<td>3. Student will be able to understand the basics of noise reduction and design applications of noise control</td>
</tr>
<tr>
<td>17ARES534</td>
<td>Product Design</td>
<td>1. Student will gain knowledge about the various furniture and products</td>
<td>2. Student will understand the needs of the industry demand and product value</td>
</tr>
<tr>
<td>17ARES535</td>
<td>Building Services For Special Buildings</td>
<td>1. Student will be able to understand and design high rise buildings with essential services</td>
<td>2. Student will gain knowledge in advanced services</td>
</tr>
<tr>
<td>16ARP711</td>
<td>Practical Training - I</td>
<td>1. Student will get and overall idea of the nuances of architectural practice.</td>
<td>2. Student will understand about the total process that takes place in an Architectural firm</td>
</tr>
<tr>
<td>15ART901</td>
<td>Project Management</td>
<td>1. Student will understand a project from concept to commissioning.</td>
<td>2. Student will understand the feasibility study &amp; facility programme, design, construction to commissioning.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Students Will Gain Understanding Of</td>
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<tr>
<td>15ART902</td>
<td>Urban Design</td>
<td>4. Student will understand about the Project Costing&lt;br&gt;5. Student will understand about the various software of project management.&lt;br&gt;6. Student will gain understanding of principles of management, construction scheduling, scope definition and team roles</td>
<td></td>
</tr>
<tr>
<td>15ARS921</td>
<td>Advanced Design – Urban</td>
<td>1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.&lt;br&gt;2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project&lt;br&gt;3. Student will be able to transform the theoretical ideas to the tangible output of design.&lt;br&gt;4. Student will be able to understand the space organization, space- volume design approach in large scale projects&lt;br&gt;5. Student will be able to research, Analyse and Deliver a Urban Design proposal&lt;br&gt;6. Student will be able to Communicate effectively through the design ideas.</td>
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<tr>
<td>15ARS922</td>
<td>Estimation And Costing</td>
<td>1. Student will be able to understand and write specification for the given item of work&lt;br&gt;2. Student will gain knowledge &amp; Understanding of Estimation of civil work&lt;br&gt;3. Student will gain knowledge about estimation of Carpentry work&lt;br&gt;4. Student will gain knowledge about estimation of plumbing work&lt;br&gt;5. Student will be able to do calculate the quantities on site with Field measurement book&lt;br&gt;6. Student will learn about various calculation of bill of quantities for Interiors</td>
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<tr>
<td>15ARE931 A</td>
<td>Developmental Rules And Regulations</td>
<td>1. Student will be able to read and understand government related documents and incorporate it in practice&lt;br&gt;2. Student will be able to understand the building regulations and follow accordingly&lt;br&gt;3. Student will understand about the legislation of corporation areas&lt;br&gt;4. Student will understand about the legislation of panchayat&lt;br&gt;5. Student will understand about the legislation of Industries</td>
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<td>No.</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Objectives</td>
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<tr>
<td>31</td>
<td>15ARE931B</td>
<td>Construction Technology</td>
<td>6. Student will be able to design buildings as per the recent norms and standards</td>
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<td>1. Ability to understand the practice of construction technology</td>
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<td>2. Ability to understand the construction systems for high rise buildings</td>
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<td>3. Ability to understand the process of manufacture, storage and transportation of concrete</td>
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<td>4. Ability to understand the various equipment used in the construction industry</td>
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<td>5. Ability to understand the criteria for choice of equipment</td>
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<td>6. Students will gain an overview of construction management, planning and scheduling.</td>
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<td>1. Student will be able to understand the practice of safety standards</td>
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<td>2. Student will gain knowledge in Fire safety standards &amp; practice considerations</td>
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<td>3. Student will understand about the integrated building management systems</td>
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<td>4. Student will gain understanding in building automation systems</td>
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<td>5. Student will become familiar with integrated services for multistoried buildings</td>
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<td>6. Student will learn about the new concepts of Security and building Management systems</td>
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<tr>
<td>33</td>
<td>15ARE931D</td>
<td>Earth Quake Resistance Architecture</td>
<td>6. Student will learn about the new concepts of Security and building Management systems</td>
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<td></td>
<td>1. Student will be able to understand the formation and causes of earthquakes</td>
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<td>2. Student will gain understanding of the factors to be considered in the design of buildings</td>
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<td>3. Student will understand the services to resist earthquakes.</td>
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<td>4. Student will become familiar with the Seismic Design Codes &amp; configurations</td>
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<td>5. Student will understand about designing earth quake resistant structures</td>
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<td>6. Student will learn about urban level planning strategies for earth quake resistance</td>
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<tr>
<td>34</td>
<td>15ARE931E</td>
<td>Digital Architecture</td>
<td>6. Student will learn about urban level planning strategies for earth quake resistance</td>
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<td>1. Student will learn about the Latest digital applications used in the architectural practice</td>
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<td>2. Student will gain knowledge about parametric applications in design</td>
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<td>3. Student will learn about the building visualization &amp; Simulation</td>
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<td>4. Student will learn about Advanced rendering techniques</td>
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<td>5. Student will learn about animation and visualization techniques used in the architecture industry</td>
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<td>6. Student will learn about the video presentations and realistic animations of buildings</td>
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<tr>
<td>35</td>
<td>15ARE931F</td>
<td>Advanced Concrete Technology</td>
<td>5. An understanding of Statistical quality control- sampling and acceptance criteria</td>
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<td>1. An understanding of the classification and specifications in concrete</td>
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<td>2. An understanding of special types of concrete and concreting methods</td>
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<td>3. An understanding of the Chemical composition and Testing of concrete</td>
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<td>4. An understanding of properties and durability of concrete</td>
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</table>
| 36 15ARE931G | Real Estate Management | 1. Student will gain knowledge in the concepts of Real estate development  
2. Student will understand about Property development  
3. Student will learn about urban level policies in Real estate management  
4. Student will learn about the corporate Real estate management  
5. Student will gain knowledge in Project financing and development  
6. Student will understand the Current scenario through case studies |
| 37 19ART201 | History Of Architecture II | 1. Student will understand the various Architecture features and its outcome due to various social, political and economic upheavals, and its response to the cultural and context.  
2. Student will understand about the spatial and stylistic qualities associated with Buddhist architecture.  
3. Student will understand about the spatial and stylistic qualities associated with Chalukyan architecture.  
4. Student will understand about the spatial and stylistic qualities associated with Roman, Romanesque and Gothic architecture  
5. Student will understand the Styles and Details of Gothic Architecture  
6. Student will expertise in Spatial understanding of historical places by Sketching & reading |
| 38 19ART202 | Concept Of Building Structures | 1. Student will understand the concepts of action of forces on a body and should be able to apply the equilibrium concepts.  
2. Student will understand the basic geometric properties and the behavior of materials under effect of forces  
3. Student will understand the various structural components of the building and its usage for strength of the structure.  
4. Student will understand about the Reinforced structures structural system and ability  
5. Student will understand about Steel Structures in Architectural Design  
6. Student will relate to various building structural components |
| 39 19ART203 | Theory Of Architecture | 1. Student will understand on the definition of architecture; elements of architectures of form.  
2. Student will be exposed to the principles of architecture and applications of the same in buildings and spaces.  
3. Student will understand the meaning of character and style of buildings with examples.  
4. Student will understand on ideologies and philosophies of architectures of contemporary  
5. Student will understand about the theoretical aspects of Architectural Design  
6. Student will gain Knowledge in the Vocabulary of the Architectural Terms and language |
| 40 19ARP211 | Computer Application - I | 1. Student will be able to express using digital tools in the realm of visual composition, drafting, 3D visualization and rendering  
2. Student will be able to draw measured drawings using the software |
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<th>Table</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Student will be able to</th>
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</table>
| 41    | 19ARS221    | Architectural Design - II | 1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.  
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project  
3. Student will be able to transform the theoretical ideas to the tangible output of design.  
4. Student will be able to understand the space organization, space-volume design approach  
5. Student will be able to research, Analyse and Deliver a Architectural Design.  
6. Student will be able to Communicate effectively through the design ideas |
| 42    | 19ARS222    | Building Materials And Construction - I | 1. Student will gain Knowledge of properties and construction methods of brick, clay products and timber products.  
2. Student will be able to detail structural and nonstructural components of simple buildings using the above materials.  
3. Student will understand to integrate knowledge of properties and construction methods of basic building materials in the design of simple projects.  
4. Student will understand about the Bamboo construction techniques.  
5. Student will be able to gain advanced knowledge about Timber Roof Constructions.  
6. Student will understand the building construction techniques of the traditional / rural houses |
| 43    | 19ARS223    | Measured Drawing And Documentation | 1. Student will be able to construct and draw detailed architectural working drawings  
2. Student will understand the 3d views and perspective drawings of the buildings.  
3. Student will understand the detailed specifications of a small construction drawing  
4. Student will learn to Collect the building data and document accordingly  
5. Student will develop the skill of making an Architectural Working Drawing  
6. Student will develop skill of reading an Interior working Drawing |
| 44    | 18ART401    | Climate Responsive Architecture | 1. Student will understand the whole climatic scenario of the world  
2. Student will learn about the Solar geometry, sun path its irradiation effects and control  
3. Student will learn about heat transfer in buildings due to materials and design implications.  
4. Student will understand about the Various ventilation principles and techniques for good ventilation |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Student Outcomes</th>
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</table>
| 18ART402   | Contemporary Architecture I      | 1. Student will understand the spread and varied later directions of modern architecture across the world.  
2. Student will understand the architectural production from the 1960s as driven by large scale changes across the world.  
3. Student will become familiar with contemporary forces and directions in architecture across the world.  
4. Student will understand the basis of Architecture revolutions and its changes in every decade  
5. Student will understand the Ideologies of various Architects & their Works  
6. Student will impart this Knowledge in his Architectural Design |
| 18ART403   | Design Of Structures I           | 1. Student will understand about Various Timber sections.  
2. Student will understand about the design timber beams and columns by applying the code provisions.  
3. Student will understand about the Steel Sections and its usage.  
4. Student will be able to design steel joints for maximum efficiency and strength.  
5. Student will be able to design tension and compression members for different conditions by applying the code provisions.  
6. Student will be able to design different types of laterally unsupported & supported beams for different conditions. |
| 18ARP411   | Computer Application -III        | 1. Student will be able to understand the use of digital tools in the realm of visual composition,  
2. Student will understand the drafting & Details through Software  
3. Student will develop the skill of 3D visualization and rendering  
4. Student will understand the concept of BIM- building information modelling through the specific software  
5. Student will gain the Skill of Multimedia & video making presentations required for Architectural practice  
6. Student will gain knowledge about the latest developments of digital applications in Architecture |
| 18ARS421   | Architectural Design -IV         | 1. Student will be able collect data, assimilate and integrate knowledge in a holistic manner.  
2. Student will learn about the Sensitivity towards the nature and values of unselfconscious and collective design as well as the interconnectedness of human society and environment  
3. Student will learn about traditional techniques and concepts of Architecture.  
4. Student will learn about the evolution and transformation of the rural settlements according to the time and cultural context.  
5. Student will understand the essence of rural planning  
6. Student will develop the skill of design process for the Rural settlements |
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<tr>
<th>Code</th>
<th>Subject</th>
<th>Outcomes</th>
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</table>
| 50       | 18ARS423 Building Services -II               | 1. Student will gain Knowledge of design of Water distribution systems in buildings  
2. Student will learn and understand about the sewerage systems in buildings.  
3. Student will learn and understand about the plumbing systems  
4. Student will understand the electrical layout for residential Building  
5. Student will gain basic knowledge about compressors, evaporators and refrigerant control devices  
6. Student will understand the Applications of building Services in advanced level by detailed Drawings |
| 51       | 17ART601 Building Codes And Regulations      | 1. Student will be able to read and understand government related documents and incorporate it in practice  
2. Student will be able to understand the building regulations and follow accordingly  
3. Student will understand about the legislation of corporation areas  
4. Student will understand about the legislation of panchayat  
5. Student will understand about the legislation of Industries  
6. Student will be able to design buildings as per the recent norms and standards |
| 52       | 17ART602 Physical Planning                  | 1. Student will understand morphology of settlements and their generating forces and characteristics.  
2. Student will understand the role of planning processes in making positive changes to settlements.  
3. Student will gain knowledge and awareness of planning interventions with respect to the current world.  
4. Student will gain understanding about the city evolution process due to planning  
5. Student will gain Knowledge about existing settlements by Survey studies  
6. Student will gain vast knowledge about Landsue patterns and planning theories |
| 53       | 17ARS621 Architectural Design VI             | 1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.  
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project  
3. Student will be able to transform the theoretical ideas to the tangible output of design.  
4. Student will be able to understand the space organization, space- volume design approach in large scale projects  
5. Student will be able to research, Analyse and Deliver a Campus Design.  
6. Student will be able to Communicate effectively through the design ideas |
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</table>
|  54 | 17ARS622 | Architectural Detailing And Working Drawing | 1. Student will gain understanding of all the aspects that go into the making of a building through study of drawings related to construction.  
2. Student will gain the ability to resolve spatial concerns with technical aspects and services of a building.  
3. Student will understand to design and detail components within a building.  
4. Student will gain knowledge in interior detailing and planning  
5. Student will gain knowledge in Interior furniture, fixtures as per the functionality  
6. Student will gain understanding in the installation methods of cladding, integrated services by means of detailed drawings etc |
|  55 | 17ARS623 | Sustainable Architecture | 1. Student will understand about climate change and the need for the sustainable buildings  
2. Student will understand the energy-based concepts and resource optimisation  
3. Student will understand about the environmental impacts of today and Follow the Sustainable approach  
4. Student will gain ability to design energy efficient buildings  
5. Student will understand the green concepts and apply them in every aspect and approach towards sustainable architecture  
6. Student will understand about the building simulation for energy analysis and for various design solutions |
|  56 | 17ARET63 1 | Vernacular Architecture | 1. Student will understand the Indian vernacular architecture as a process and to also provide an overview of various approaches and concepts towards its study.  
2. Student will gain Knowledge of vernacular architectural forms in different regions.  
3. Student will gain understanding of the impact of colonial rule on vernacular architecture in India  
4. Student will understand about the climatic consideration & Design aspects  
5. Student will understand the socio economic aspects existed in the various regions through the study of vernacular Architecture  
6. Student will gain knowledge in the vernacular methods of construction and ways to incorporate in this modern architecture. |
|  57 | 17ARET63 2 | Progressive Architecture | 1. Student will be able to understand and evolve futuristic design ideas and concepts  
2. Student will be able to integrate various aspects of design thinking of future  
3. Student will understand about the parametric design concepts and applications  
4. Student will understand about the concept of Biomimicry  
5. Student will gain knowledge about the Adaptive reuse  
6. Student will gain knowledge about energy integration and zero energy development. |
|  58 | 17ARES63 3 | Interior Design | 1. Student will gain knowledge and understanding in Interior design  
2. Student will understand the various elements in Interior Design  
3. Student will gain knowledge in terms of Interior design lighting and accessories |
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<tr>
<td>4. Student will gain an overall exposure to the ways in which interior spaces can be enriched through the design of specific interior components.</td>
<td>5. Student will be able to do specification for an Interior Design layout</td>
<td>6. Student will be able to design a Interior project with all working drawing</td>
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<tr>
<td>59</td>
<td>17ARES63 4</td>
<td>Digital Architecture</td>
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<tr>
<td>1. Student will learn about the Latest digital applications used in the architectural practice</td>
<td>2. Student will gain knowledge about parametric applications in design</td>
<td>3. Student will learn about the building visualization &amp; Simulation</td>
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<td>4. Student will learn about Advanced rendering techniques</td>
<td>5. Student will learn about animation and visualization techniques used in the architecture industry</td>
<td>6. Student will learn about the video presentations and realistic animations of buildings</td>
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<tr>
<td>60</td>
<td>16ARP811</td>
<td>Practical Training - II</td>
</tr>
<tr>
<td>1. Student will get an overall idea of the nuances of architectural practice.</td>
<td>2. Student will understand about the total process that takes place in an Architectural firm</td>
<td>3. Student will understand the Specifications of a project, time involved and the execution process</td>
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<td>4. Student will gain knowledge in architectural working drawings</td>
<td>5. Student will gain experience of client meetings &amp; site Execution</td>
<td>6. Student will gain the maturity of Architectural design, and the experience gained from internship will be helpful in the thesis project</td>
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<tr>
<td>61</td>
<td>16ARP821</td>
<td>Dissertation</td>
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<td>1. Student will learn to research on a specific interested topic and collect appropriate data</td>
<td>2. Student will develop the skill of analytical approach towards the related topic</td>
<td>3. Student will be able to develop a coherent line of thought based on point of view,</td>
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<td>4. Student will be able to do observation, analysis and study</td>
<td>5. Student will be able to prepare a dissertation report which is based on accepted norms of technical writing.</td>
<td>6. Student will become prepared for the larger thesis project.</td>
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<tr>
<td>62</td>
<td>15ARS102 1</td>
<td>Architectural Thesis</td>
</tr>
<tr>
<td>1. Student will gain an overall understanding of an Architectural project</td>
<td>2. Student will be able to research, Analyse, synthesize and present his ideas</td>
<td>3. Student will apply his skills developed in the previous years in this Project</td>
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<td>4. Student will gain the ability to handle major architectural project of a larger scale</td>
<td>5. Student will be able to design with all Socio, economic and Environmental aspects.</td>
<td>6. Student will become an expertise in his domain of architectural design</td>
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<tr>
<td>63</td>
<td>15ARS103 1A</td>
<td>Industrial Architecture</td>
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<tr>
<td>1. Student will understand the application of Industrial buildings</td>
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<td>2.</td>
<td>Student will gain understanding about the pre fabrication systems</td>
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<td>3.</td>
<td>Student will gain Knowledge in Industrial construction</td>
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<td>4.</td>
<td>Student will understand about the modular components &amp; coordination of Industrial Buildings</td>
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<td>5.</td>
<td>Student will understand about the overall structural system of Industrial buildings</td>
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<td>6.</td>
<td>Student will be able to design large scale Industrial buildings</td>
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| 64    | 15ARS103 1B Green Building       | 1. Student will understand the basic concept of sustainability in Architecture  
2. Student will gain knowledge in passive and Hybrid design strategies for designing a green building  
3. Student will understand the energy usage of various types of buildings  
4. Student will learn about energy efficiency and ways to minimize the energy.  
5. Student will learn about the environmental impacts and assessment  
6. Student will gain knowledge about the green rating systems and codes in India |
| 65    | 15ARS103 1C Research Methods     | 1. Student will understand the research methodology and research methods  
2. Student will understand the various analytical methods  
3. Student will understand the experimental methods of Research  
4. Student will learn about the survey methods and documentation  
5. Student will know to collect relevant data, compile and document  
6. Student will be able to critically analyse the data and present it as a document |
| 66    | 15ARS103 1D Medical Architecture | 1. Student will understand the important fields of health care industry  
2. Student will understand the standards to be followed in Health care industry in accordance to architecture  
3. Student will understand the services involved in the health care industry  
4. Student will learn about the survey methods and documentation  
5. Student will know about the various delivery systems and operations involved in health care industry  
6. Student will be able to design for a health care sector with green concepts and with environmental quality |
| 67    | 15ARS103 1E Exhibition Design    | 1. An understanding of the Exhibition design  
2. An understanding of the retail Architecture  
3. An understanding of the major services in exhibition design  
4. An understanding of planning aspects of the Exhibition Design  
5. An understanding of the marketing theories & retail branding techniques  
6. An understanding of the advanced level of Exhibition Structures |
| 68    | 15ARS103 1F Progressive Architecture | 1. Student will be able to understand and evolve futuristic design ideas and concepts                                           |
2. Student will be able to integrate various aspects of design thinking of future  
3. Student will understand about the parametric design concepts and applications  
4. Student will understand about the concept of Biomimicry  
5. Student will gain knowledge about the Adaptive reuse  
6. Student will gain knowledge about energy integration and zero energy development.

| 69 | 15ARS103 1G | HGH Rise Buildings | 1. Student will learn about the Design and planning aspects of High-rise structures  
2. Student will gain knowledge about the National building Codes of high-rise structures  
3. Student will understand about the various development control regulations all over India  
4. Student will gain knowledge about the Structural aspects of High-Rise buildings  
5. Student will gain knowledge about various technical services involved in High rise buildings  
6. Student will gain knowledge about functionality of the high-rise structures |
Name of the Department : **Faculty of Architecture**

**Course** : M. Arch.

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<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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| 1      | 18MARS311   | Dissertation - I                       | 1. Student will be able to identify the thrust area of research  
2. Student will understand and develop his own dissertation topic with research -oriented study  
3. Student will know the basis of experimentation, methods and applications  
4. Student will understand the core ideas of Application design through the experimental research  
5. Student will be able to analyse and synthesize a defined context with in-depth study and scientific approach  
6. Student will be able to provide innovative and practical solutions for the future architecture. |
| 2      | 18MARESS4   | Sustainable Building Systems           | 1. Student will be able to gain knowledge and application of low energy building design  
2. Student will understand the thermal quality standards and its importance in various countries  
3. Student will understand the use of green materials and products for a sustainable future.  
4. Student will be able to calculate the energy consumption features and the cost audits.  
5. Student will be able to understand the integrated building management systems for a controlled environment.  
6. Student will be able to understand the energy and cost audits |
| 3      | 18MARESS5   | Sustainable Trends And Theories         | 1. Student will be able to understand the policy level mechanisms and design process and product accordingly.  
2. Student will understand the vernacular/traditional building types and its applications to the modern context by its systems and materials.  
3. Student will understand to use the site in an optimum manner and know about the operational and maintenance practices.  
4. Student will gain knowledge about biomimicry and its importance in sustainable design  
5. Student will gain knowledge about futuristic design systems and new material applications.  
6. Student will Understand about the Adaptive Reuse & urban Generation |
| 4      | 18MARESH4   | Community Participation In Housing      | 1. Student will be able to develop a model for both the end user and the service provider  
2. Student will be able to involve in planning in design stages  
3. Student will be able to understand the intricacies of Community participation in Housing |
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4. Student will be able to give design solution for the future community housing  
5. Student will gain Knowledge about the best practices in Community housing  
6. Student will know about various typologies of community housing

5 18MARESH5 Special Types Of Housing  
1. Student will learn and understand the Vernacular Architecture of various regions of world  
2. Student will learn and understand the Vernacular Architecture of various regions of India  
3. Student will learn and understand the Vernacular Architecture of various regions of Tamilnadu  
4. Student will learn about design aspects and historical methods of construction which can be adopted for a particular context  
5. Student will learn and understand the types of housing in disaster prone areas  
6. Student will be able to Propose the housing trend for the Future

6 19MARS111 Research Methodology - I  
1. Student will understand the methods of research  
2. Student will be able to develop the Skill of field study and experimentation  
3. Student will understand the research application in the field of Architectural Design  
4. Student will understand about the collection of data and Analyse the data  
5. Student will develop the skill of documentation of various Survey and Research  
6. Student will be able to prepare documents, report writing and publish in journals

7 19MARS112 Design Systems  
1. Student will be able to understand the various design systems in the Architecture era  
2. Student will be able to understand the vernacular architecture and its importance  
3. Student will understand the contemporary design process  
4. Student will develop the skill of Design thinking as per the Current situation  
5. Student will develop the skill of presentation of his ideas by Seminar and presentation  
6. Student will be able to envision the futuristic architecture

8 19MARS113 Design Research And Field Studies  
1. Student will be able to collect data and information as per the context  
2. Student will understand the methods of Field Survey  
3. Student will understand the method of collection and compilation of Data of Survey & Field Study  
4. Student will be able to format all the data into types and to prepare and publish  
5. Student will be able to critically find solutions with the analytical skills of research  
6. Student will develop the Skill of Report Writing
<table>
<thead>
<tr>
<th>Page</th>
<th>Code</th>
<th>Module Title</th>
<th>Student Outcomes</th>
</tr>
</thead>
</table>
| 9    | 19MARS114 | Advanced Design Studio - I | 1. Student will be able to design complex structures with advanced level planning principles  
2. Student will be able to understand the Urban Renewal and urban level design  
3. Student will be able to Design large scale projects  
4. Student will understand the Physiological and Psychological aspects in advanced level of Design  
5. Student will be able to give a wholesome product of design in all aspects  
6. Student can give futuristic proposals for the urban Architecture |
| 10   | 19MARESS1 | Introduction To Sustainable Architecture | 1. Student will understand the fundamentals of sustainable concepts and applications  
2. Student will understand the Site planning principles and its applications  
3. Student will understand the climate and its impacts in indoor thermal comfort  
4. Student will understand the energy usage ratio and the effective steps of conservation and utilization of energy.  
5. Student will understand the Green building Rating Systems in a Broader context  
6. Student will understand the Effective methods to propose green buildings through Case Studies |
| 11   | 19MARESH1 | Introduction To Housing Design | 1. Student will be able to gain knowledge about housing typologies  
2. Student will understand about the theories and concepts of community and Neighbourhood  
3. Student will understand about the emerging trends in housing  
4. Student will understand about the housing finance schemes and management  
5. Student will understand the relation of housing and real estate management in the global and local scenario.  
6. Student will Understand the Basis of Housing Demand all over the world |
| 12   | 18MARS411 | Dissertation-II | 1. Student will be able to identify the thrust area of research  
2. Student will understand and develop his own dissertation topic with research-oriented study  
3. Student will know the basis of experimentation, methods and applications  
4. Student will understand the core ideas of Application design through the experimental research  
5. Student will be able to analyse and synthesize a defined context with in-depth study and scientific approach  
6. Student will be able to provide innovative and practical solutions for the future architecture by Design |
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<th>Page</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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</table>
| 13    | 19MARS211   | Research Methodology - II              | 1. Student will understand the methods of research  
2. Student will be able to develop the Skill of field study and experimentation  
3. Student will understand the research application in the field of Architectural Design  
4. Student will understand about the collection of data and Analyse the data  
5. Student will develop the skill of documentation of various Survey and Research  
6. Student will be able to prepare documents, report writing and publish in journals |
| 14    | 19MARS212   | Documentation And Presentation         | 1. Student will be able to review the literature and analyse every aspect of the study  
2. Student will understand the importance and method of Experimentation  
3. Student will be able to organize formal seminars  
4. Student will be able to present with technical ideas and analysis  
5. Student will be able to do paper presentation in journals, magazines and write review  
6. Student will be able to make a good frame work of his Dissertation / Thesis |
| 15    | 19MARS213   | Advanced Design Studio - II            | 1. Student will be able to design complex structures with advanced level planning principles  
2. Student will be able to understand & design as per the Sustainability aspects  
3. Student will be able to Design large scale projects  
4. Student will understand the Physiological and Psychological aspects in advanced level of Design  
5. Student will be able to give a wholesome product of design in all aspects  
6. Student can give futuristic proposals for the urban Architecture. |
| 16    | 19MARESS2   | Building Performance Analysis          | 1. Student will understand the effects of indoor comfort through software simulation and analysis  
2. Student will be able to achieve a quantitative result of thermal analysis by software simulations  
3. Student will be able to effectively use the modelling tools and techniques  
4. Student will be able to design a building with good thermal comfort with optimum design solutions  
5. Student will be able to give quantitative results of Daylighting and Ventilation of a building  
6. Student will be able to give an energy performance index of a building. |
| 17    | 19MARESS3   | Sustainable Design Strategies          | 1. Student will be able to apply the Sustainable design strategies in architecture, Design and environment  
2. Student will be able to give design solutions of |
<table>
<thead>
<tr>
<th>18</th>
<th>19MARESH2</th>
<th>Housing Policies And Schemes</th>
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</thead>
<tbody>
<tr>
<td>1. Student will learn and gain knowledge the housing schemes and policies</td>
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<tr>
<td>2. Student will gain knowledge about the urban housing scenario</td>
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<td>3. Student will gain knowledge about the rural housing scenario</td>
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<td>4. Student will gain knowledge about the stakeholders in the housing</td>
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<td>5. Student will gain knowledge about the systematic approach for the future housing demand.</td>
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<td>6. Student will gain knowledge about the Schemes of Central &amp; State government</td>
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<tr>
<th>19</th>
<th>19MARESH3</th>
<th>Sustainable Housing</th>
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<tbody>
<tr>
<td>1. Student will be able to understand the sustainable site planning with site inventory and analysis</td>
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<td>2. Student will understand about Affordable housing techniques</td>
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<td>3. Student will learn about cost effective techniques in housing.</td>
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<td>4. Student will be able to understand the resource mapping</td>
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<td>5. Student will be able to understand the advance level building services</td>
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<td>6. Student will be able to understand &amp; design high performance houses</td>
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<tr>
<td>1.</td>
<td>19BP101T</td>
<td>Human Anatomy and Physiology – I Theory</td>
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<tr>
<td>2.</td>
<td>19BP102T</td>
<td>Pharmaceutical Analysis Theory</td>
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<td>3.</td>
<td>19BP103T</td>
<td>Pharmaceutics Theory</td>
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<td>4.</td>
<td>19BP104T</td>
<td>Pharmaceutical Inorganic Chemistry Theory</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Prerequisite</td>
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<tr>
<td>6. 19BP105T</td>
<td>Communication skills Theory</td>
<td>5. 19BP105T</td>
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<tr>
<td>6. 19BP106RBT</td>
<td>Remedial Biology Theory</td>
<td>5. 19BP106RBT</td>
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<td>7. 19BP106RMT</td>
<td>Remedial Mathematics Theory</td>
<td>6. 19BP106RBT</td>
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<tr>
<td>8. 19BP107P</td>
<td>Human Anatomy and Physiology – I Practical</td>
<td>7. 19BP106RMT</td>
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<tr>
<td>9. 19BP108P</td>
<td>Pharmaceutical Analysis Practical</td>
<td>8. 19BP107P</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>On successful completion of the course the student will</td>
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<td>10. 19BP109P</td>
<td>Pharmaceutics Practical</td>
<td>1. Understand the professional way of preparing a prescription.</td>
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<td>2. Prepare various liquid dosage forms.</td>
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<td>3. Prepare various solid dosage forms.</td>
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<td>4. Prepare various semi solid dosage forms.</td>
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<td>5. Perform quality control tests for various dosage forms.</td>
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<td>6. Acquire the knowledge of using equipment’s in pharmaceutical industry.</td>
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<td></td>
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<td>2. Perform Limit test for metals.</td>
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<td>3. Identify inorganic pharmaceuticals.</td>
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<td>4. Test the inorganic sample for its purity.</td>
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<td>5. Determine the physical properties of inorganic pharmaceuticals.</td>
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<td>6. Prepare inorganic pharmaceuticals.</td>
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<tr>
<td>12. 19BP111P</td>
<td>Communication skills Practical</td>
<td>1. Communicate effectively to meet the people, ask question and make friends.</td>
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<td>2. Understand the do’s and don’ts of effective communication.</td>
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<td>3. Pronounce the sounds effectively.</td>
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<td>4. Explain the figures of speech and direct/indirect speech.</td>
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<td>5. Write effectively mails and other written communications.</td>
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<td>6. Present a topic in a gathering.</td>
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<tr>
<td>13. 19BP112RBP</td>
<td>Remedial Biology Practical</td>
<td>1. Understand the microscope, cutting sections, mount, stain and slide preparation.</td>
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<td>2. Study cell and its organelles.</td>
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<td>3. Study the parts of plant and their modifications.</td>
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<td>4. Study the system in from using software.</td>
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<td>5. Identify types of bones.</td>
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<td>6. Determine blood group, blood pressure and tidal volume.</td>
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<tr>
<td>14. 19BP201T</td>
<td>Human Anatomy and Physiology – II Theory</td>
<td>1. Explain the gross morphology, structure and functions of various organs of the human body.</td>
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<td>2. Describe the various homeostatic mechanisms and their imbalances.</td>
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<td>3. Identify the various tissues and organs of different systems of human body.</td>
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<td>4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.</td>
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<td>5.</td>
<td>Appreciate coordinated working pattern of different organs of each system.</td>
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<td>6.</td>
<td>Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.</td>
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<td><strong>15.</strong></td>
<td><strong>19BP202T</strong></td>
<td>Pharmaceutical Organic Chemistry – I Theory</td>
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<tr>
<td>On successful completion of the course the student will</td>
<td>1. Understand the classification and nomenclature of organic compounds, and the concepts of isomerism.</td>
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<td>2. Write the structure, name and the type of isomerism of the organic compound.</td>
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<td>3. Schematize the reaction/reaction mechanism and name the reaction</td>
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<td>4. Explain the orientation of reactions.</td>
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<td>5. Account for reactivity/stability of compounds.</td>
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<td>6. Identify/confirm the organic compounds.</td>
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<td><strong>16.</strong></td>
<td><strong>19BP203T</strong></td>
<td>Biochemistry Theory</td>
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<tr>
<td>On successful completion of the course the student will</td>
<td>1. Explain the types and importance of biomolecules.</td>
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<td>2. Explain the bioenergetics and energy rich compounds.</td>
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<td>3. Understand the metabolism of nutrient molecules in physiological and pathological conditions.</td>
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<td>4. Elaborate the biological oxidation emphasizing electron transport chain and oxidative phosphorylation.</td>
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<td>5. Describe the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.</td>
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<td>6. Discuss the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.</td>
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<td><strong>17.</strong></td>
<td><strong>19BP204T</strong></td>
<td>Pathophysiology Theory</td>
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<tr>
<td>On successful completion of the course the student will</td>
<td>1. Explain the description about the types of system and related disorders.</td>
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<td>2. Name the signs and symptoms of the diseases.</td>
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<td>3. Mention the complications of the diseases.</td>
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<td>4. Describe the mechanism of the diseases.</td>
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<td>5. Understand the etiology and pathogenesis of diseases.</td>
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<td>6. Discuss about the Sexually transmitted diseases.</td>
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<td><strong>18.</strong></td>
<td><strong>19BP205T</strong></td>
<td>Computer Applications in Pharmacy Theory</td>
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<tr>
<td>On successful completion of the course the student will</td>
<td>1. Describe the various types of application of computers in pharmacy.</td>
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<td>2. Understand the various types of databases.</td>
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<td>3. Discuss the applications of databases in pharmacy.</td>
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<td>4. Understand the concept of bioinformatics.</td>
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<td>5. Explain the data analysis in Preclinical development.</td>
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<td>6. Elaborate the applications of bioinformatics in Vaccine Discovery.</td>
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<td><strong>19.</strong></td>
<td><strong>19BP206T</strong></td>
<td>Environmental sciences Theory</td>
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<tr>
<td>On successful completion of the course the student will</td>
<td>1. Create awareness about environmental problems among learners.</td>
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<tr>
<td>20.</td>
<td>19BP207P</td>
<td>Human Anatomy and Physiology – II Practical</td>
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<td>21.</td>
<td>19BP208P</td>
<td>Pharmaceutical Organic Chemistry – I Practical</td>
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<td>22.</td>
<td>19BP209P</td>
<td>Biochemistry Practical</td>
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<td>23.</td>
<td>19BP210P</td>
<td>Computer Applications in Pharmacy Practical</td>
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<td>24.</td>
<td>18BP301T</td>
<td>Pharmaceutical Organic Chemistry – II Theory</td>
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</table>
2. Understand the acidic/basic properties, qualitative tests, structure and uses of Phenols, Aromatic amines, Aromatic acids and its derivatives.
3. Explain the effect of substituents on acidity and basicity of phenols, aromatic acids and aromatic amines.
4. Describe the Definition/difference, properties and analytical constants pertaining to Fats and Oils.
5. Emphasize the synthesis, reactions and uses of Polynuclear hydrocarbons and its derivatives.
6. Explain the synthesis, reactions and stability of cycloalkanes.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Theory/Practical</th>
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<tbody>
<tr>
<td>25. 18BP302T</td>
<td>Physical Pharmaceutics – I</td>
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<tr>
<td>26. 18BP303T</td>
<td>Pharmaceutical Microbiology</td>
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<tr>
<td>27. 18BP304T</td>
<td>Pharmaceutical Engineering</td>
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<tr>
<td>28. 18BP305P</td>
<td>Pharmaceutical Organic Chemistry –II</td>
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</table>

On successful completion of the course the student will

1. Understand various physicochemical properties of drug molecules in the design of dosage forms.
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
3. Develop a clear idea about solubilisation and techniques for identifying the phenomenon.
4. Discover the term complexation and protein binding and its effect in the formulation of new dosage forms.
5. Identify the importance of pH and buffers in pharmaceutical systems.
6. Achieve a better insight into various areas of formulation, research and development.

On successful completion of the course the student will

1. Understand methods of identification, cultivation and preservation of various microorganisms.
2. To understand the importance and implementation of sterilization in pharmaceutical processing and Industry.
3. Learn sterility testing of pharmaceutical products.
4. Carry out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.
6. Develop knowledge on different types of microscopes in pharmaceutical industry.

On successful completion of the course the student will

1. Know various unit operations used in Pharmaceutical industries.
2. Understand the material handling techniques.
3. Perform various processes involved in pharmaceutical manufacturing process.
4. Appreciate and comprehend significance of plant lay out design for optimum use of resources.
5. Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
6. Execute various tests to prevent environmental pollution.

On successful completion of the course the student will

1. Demonstrate recrystallization and its applications.
2. Demonstrate steam distillation and its applications.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Practical/Theory</th>
<th>On successful completion of the course the student will</th>
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<tbody>
<tr>
<td>3.</td>
<td>Determined the qualitative parameters of oil.</td>
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<td>1. Understand the physicochemical parameters of a drug.</td>
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<td>2. Identify methods to enhance solubility of a new drug moiety.</td>
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<td>3. Discover the importance of stability in pharmaceutical preparations.</td>
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<td>4. Build practical skills for new drug development process.</td>
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<td>5. Determine the physicochemical parameters.</td>
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<td>6. Determine the physical constants of a drug.</td>
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<td>29. 18BP306P Physical Pharmaceutics – I Practical</td>
<td></td>
<td>1. Understand the physicochemical parameters of a drug.</td>
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<td>2. Identify methods to enhance solubility of a new drug moiety.</td>
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<td>3. Discover the importance of stability in pharmaceutical preparations.</td>
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<td>4. Build practical skills for new drug development process.</td>
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<td>5. Determine the physicochemical parameters.</td>
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<td>6. Determine the physical constants of a drug.</td>
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<tr>
<td>30. 18BP307P Pharmaceutical Microbiology Practical</td>
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<td>1. Discuss about the instruments used in experimental microbiology.</td>
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<td>2. Understand the sterilization methods followed in laboratory.</td>
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<td>3. Discover the staining techniques used in microbiology.</td>
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<td>4. Carry out assay of different antibiotics.</td>
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<td>5. Understand the mechanism of action of antibiotics.</td>
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<td>6. Execute different sterility tests and bacteriological analysis of water.</td>
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<tr>
<td>31. 18BP308P Pharmaceutical Engineering Practical</td>
<td></td>
<td>1. Understand different methods like moisture content, drying curve.</td>
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<td>2. Identify different techniques like filtration, size reduction, crystallization.</td>
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<td>3. Know about distillation and steps to be followed in steam distillation.</td>
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<td>4. Summarize different instruments handled for engineering operations.</td>
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<td>5. Determine the physical constants for a formulation.</td>
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<td>6. Demonstrate the various machines used in pharmaceutical industry.</td>
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<tr>
<td>32. 18BP401T Pharmaceutical Organic Chemistry – III Theory</td>
<td></td>
<td>1. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions.</td>
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<td>2. Discuss heterocyclic compounds based on nomenclature, classification, synthesis and reactions.</td>
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<td>3. Understand the methods of preparation organic compounds.</td>
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<td>4. Understand the properties of organic compounds.</td>
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<td>5. Know the medicinal uses and other applications of organic compounds.</td>
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<td>6. Elaborate the reactions of synthetic importance.</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Course Description</td>
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<td>33.</td>
<td>18BP402T</td>
<td>Medicinal Chemistry – I Theory</td>
<td>On successful completion of the course the student will: 1. Understand the drug metabolic pathways. 2. State the chemistry of drugs with respect to their biological activity. 3. Explain the Classification, Synthesis, therapeutic value and Structural activity relationship of adrenergic agonist and antagonist drugs. 4. Describe the Classification, therapeutic value and chemistry of cholinergic agonist and antagonist drugs. 5. Brief the Classification, Synthesis, therapeutic value and Structural activity relationship of drugs acting on Central nervous system particularly sedatives, hypnotics, antipsychotics and anticonvulsants. 6. Enlight the Classification, and chemical aspects including structural activity relationship of drugs acting on Central nervous system particularly general anesthetics and analgesics.</td>
</tr>
<tr>
<td>34.</td>
<td>18BP403T</td>
<td>Physical Pharmaceutics – II Theory</td>
<td>On successful completion of the course the student will: 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms. 2. Demonstrate the principles of chemical kinetics &amp; to use them for stability testing and determination of expiry date of formulations. 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms. 4. Understand the stability enhancement techniques in pharmaceutical industry. 5. Discover the importance of accelerated stability testing in new drug formulation. 6. Achieve a better insight into various areas of formulation, research and development.</td>
</tr>
<tr>
<td>35.</td>
<td>18BP404T</td>
<td>Pharmacology – I Theory</td>
<td>On successful completion of the course the student will: 1. Explain the basics of pharmacology such as scope, historical landmarks of, drugs concept, Agonists, antagonists, spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy and various pharmacokinetic parameters. 2. Defend the Pharmacodynamics, Principles, various types of receptors and mechanisms of drugs on it, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. 3. Illustrate the Adverse drug reactions, Drug interactions, Pharmacovigilance and Drug discovery cycle. 4. Demonstrate the Organization, function of ANS, classification of neurotransmitters and the drugs acting on it. 5. Summarize the Pharmacology of drugs acting on various CNS diseases. 6. Describe the Local anesthetic agents and the drugs used in myasthenia gravis, glaucoma.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Theory/Practical</td>
<td>On successful completion of the course the student will</td>
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| 18BP405T    | Pharmacognosy and Phytochemistry – I | Theory           | 1. Understand the history, scope and development of Pharmacognosy.  
2. Explain the classification of crude drugs, Quality control of Drugs of Natural Origin, Quantitative microscopy of crude drugs.  
3. Elaborate the techniques in the cultivation and production of crude drugs.  
4. Demonstrate the plant tissue culture.  
5. Understand the traditional system of medicine.  
6. Explain the Plant Products Primary metabolites Proteins, Enzymes, Lipids, Marine drugs. |
| 18BP406P    | Medicinal Chemistry – I          | Practical        | 1. Synthesize few drugs and their intermediates.  
2. Synthesize drug intermediates.  
3. Synthesize some basic nucleus of drug candidates.  
4. Estimate the purity of drugs.  
5. Estimate the quantity of drugs present in tablet.  
6. Determine the partition coefficient of the drugs. |
| 18BP407P    | Physical Pharmaceutics – II      | Practical        | 1. Understand the Preformulation parameters to be carried out in a new drug.  
2. Discover different reaction rates.  
3. Interpret the values from accelerated stability studies.  
4. Build practical skills for new drug development process.  
5. Demonstrate the sedimentation rate of various drug products.  
6. Express the evaluation methods used in rheology. |
| 18BP408P    | Pharmacology – I                 | Practical        | 1. Understand the instruments used in experimental pharmacology.  
2. Maintain the laboratory animals as per CPCSEA guidelines.  
3. Demonstrate the Blood withdrawal, serum and plasma separation, anesthetics.  
4. Administer the drugs in different routes.  
5. Explain the euthanasia used for animal studies.  
6. Screen the drugs with the use of various pharmacological instruments. |
| 18BP409P    | Pharmacognosy and Phytochemistry – I | Practical        | 1. Analyze the crude drugs by chemical tests.  
2. Determine the stomatal number and index and vein islet number, vein islet termination and palisade ratio.  
3. Determine the starch grains, calcium oxalate crystals by eye piece micrometer.  
4. Perform the Fiber length and width starch grains by Lycopodium spore method.  
5. Analyze the purity of crude drugs by ash value and extractive value.  
6. Determine the moisture content, swelling index and foaming index. |
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Theory</th>
<th>Description</th>
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</thead>
</table>
| 41. 17BP501T | Medicinal Chemistry – II           | On successful completion of the course the student will | 1. Illustrate the classification of drugs.  
   | Theory                             |        | 2. Explain the mechanism of action of drugs.  
                                  |        | 3. Understand the chemistry of drugs with respect to  
                                  |        | their pharmacological activity.  
                                  |        | 4. Understand the drug metabolic pathways, adverse  
                                  |        | effect and therapeutic value of drugs.  
                                  |        | 5. Know the Structural Activity Relationship of  
                                  |        | different class of drugs.  
                                  |        | 6. Study the chemical synthesis of selected drugs.  |
| 42. 17BP502T | Industrial Pharmacy – I            | On successful completion of the course the student will | 1. Acquire knowledge about the various  
   | Theory                             |        | pharmaceutical dosage forms and their  
                                  |        | manufacturing techniques.  
                                  |        | 2. Discover various formulation considerations in  
                                  |        | development of pharmaceutical dosage forms like  
                                  |        | tablets, capsules, etc.  
                                  |        | 3. Understand the quality control tests for the dosage  
                                  |        | forms.  
                                  |        | 4. Detail on parenterals, stringent procedures in the  
                                  |        | preparation and its evaluation.  
                                  |        | 5. Understand clearly about packaging and cosmetic  
                                  |        | preparations.  
                                  |        | 6. Interpret the various pharmaceutical additives to be  
                                  |        | included in all dosage forms.  |
| 43. 17BP503T | Pharmacology – II                 | On successful completion of the course the student will | 1. Demonstrate the Pharmacology of drugs acting on  
   | Theory                             |        | various cardio vascular disease.  
                                  |        | 2. Explain the drug used in the therapy of shock,  
                                  |        | Pharmacology of coagulants, anticoagulants,  
                                  |        | Fibrinolytics, anti-platelet drugs, Diuretics and  
                                  |        | Anti-diuretics.  
                                  |        | 3. Illustrate the Pharmacology of Autocoids, Non-  
                                  |        | steroidal anti-inflammatory agents, Anti-gout  
                                  |        | drugs and Antirheumatic drugs.  
                                  |        | 4. Outline the Pharmacology of drugs acting on  
                                  |        | endocrine system.  
                                  |        | 5. Describe the Principles, applications of bioassay  
                                  |        | and bioassay of various drugs.  
                                  |        | 6. Summarize the drugs acting on the uterus and oral  
                                  |        | contraceptives.  |
| 44. 17BP504T | Pharmacognosy and Phytochemistry – II | On successful completion of the course the student will | 1. Explain the Composition, chemistry & chemical  
   | Theory                             |        | classes, biosources, therapeutic uses and  
                                  |        | commercial applications.  
                                  |        | 2. Metabolic pathways in higher plants and their  
                                  |        | determination.  
                                  |        | 3. Explain the modern extraction techniques,  
                                  |        | characterization and identification of the herbal  
                                  |        | drugs and Phytoconstituents.  
                                  |        | 4. Understand the preparation and development of  
                                  |        | herbal formulation.  
                                  |        | 5. Understand the herbal drug interactions.  
<pre><code>                              |        | 6. Isolate and identify the Phytoconstituents.  |
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| **45.** | 17BP505T | Pharmaceutical Jurisprudence Theory | On successful completion of the course the student will:
1. Exploit the Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Demonstrate various Indian pharmaceutical Acts and Laws.
3. Understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
4. Elicit the code of ethics during the pharmaceutical practice.
5. Acquire clear idea on drug price control order and its implication in India.
6. Acquire information regarding the licenses to be achieved for a new drug discovery process. |
| **46.** | 17BP506P | Industrial Pharmacy – I Practical | On successful completion of the course the student will:
1. Manufacture tablets.
2. Understand the strict formulation considerations in parenteral and ophthalmic manufacturing.
3. Demonstrate the evaluations of different packaging materials in pharmaceutical industry.
4. Achieve skills in making a pharmaceutical product.
5. Demonstrate the manufacturing of capsules.
6. Exploit the formulation of various cosmetics. |
| **47.** | 17BP507P | Pharmacology – II Practical | On successful completion of the course the student will:
1. Explain the in-vitro pharmacology, PA2 and PD2 values.
2. Record the Effect of drugs on frog, dog heart and blood pressure.
3. Record the DRC of acetylcholine, estimate the Bioassay of histamine, oxytocin, serotonin by interpolation bioassay method.
4. Estimate the Bioassay of histamine, oxytocin, serotonin by matching bioassay.
5. Demonstrate the Anti-inflammatory activity and Analgesic activity in animal models.
6. Explain the three point and four-point bioassay. |
| **48.** | 17BP508P | Pharmacognosy and Phytochemistry – II Practical | On successful completion of the course the student will:
1. Perform the histology and powder characteristics & extraction & detection of Phytoconstituents.
2. Isolate and detect the active principles.
3. Separate the sugars by Paper chromatography.
4. Perform TLC of herbal extract.
5. Distillate the volatile oils and detects the Phytoconstituents by TLC.
6. Analysis of crude drugs by chemical tests. |
| **49.** | 17BP601T | Medicinal Chemistry – III Theory | On successful completion of the course the student will:
1. Illustrate the classification of drugs.
2. Explain the mechanism of action of drugs.
3. Understand the chemistry of drugs with respect to their biological activity.
4. Know the metabolism, adverse effects and therapeutic value of drugs.
5. Discuss the importance of SAR of drugs. |
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<th>Course Code</th>
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</table>
| 50. 17BP602T | Pharmacology – III Theory                | 6. Understand the importance of drug design and different techniques of drug design.  
1. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.  
2. Comprehend the principles of toxicology and treatment of various poisonings.  
3. Appreciate correlation of pharmacology with related medical sciences.  
4. Enlight the chemotherapy of drugs on various Urinary tract infections and sexually transmitted diseases and Chemotherapy of malignancy.  
5. Explain about Immunopharmacology, Protein drugs, monoclonal antibodies, target drugs to antigen and biosimilars.  
6. Describe Chronopharmacology, Biological clock and its significance. |
| 51. 17BP603T | Herbal Drug Technology Theory            | On successful completion of the course the student will  
1. Understand raw material as source of herbal drugs from cultivation to herbal drug product.  
2. Explain the WHO and ICH guidelines for evaluation of herbal drugs.  
3. Elaborate the herbal cosmetics, natural sweeteners, Nutraceuticals  
4. Explain the patenting of herbal drugs, Herbal drugs industry.  
5. Demonstrate the GMP.  
6. Understand the study of Herbal cosmetics, excipients and formulations. |
| 52. 17BP604T | Biopharmaceutics and Pharmacokinetics Theory | On successful completion of the course the student will  
1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.  
2. Explain the use of plasma drug concentration-time data to calculate the pharmacokinetic parameters.  
3. Understand the concepts of bioavailability and bioequivalence of drug products and their significance.  
4. Understand various pharmacokinetic parameters, their significance & applications.  
5. Demonstrate a clear information on compartmental models and methods to assess the models.  
6. Describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. |
| 53. 17BP605T | Pharmaceutical Biotechnology Theory      | On successful completion of the course the student will  
1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries.  
2. Explain Genetic engineering applications in relation to production of pharmaceuticals.  
3. Understand the Importance of Monoclonal antibodies in Industries.  
4. Appreciate the use of microorganisms in fermentation technology.  
5. Discover different blotting techniques in pharmaceutical biotechnology. |
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<th>Description</th>
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| 54. 17BP606T | Pharmaceutical Quality Assurance Theory | On successful completion of the course the student will  
1. Understand the cGMP aspects in a pharmaceutical industry.  
2. Explain the importance of documentation.  
3. Discuss the scope of quality certifications applicable to pharmaceutical industries.  
4. Elaborate the responsibilities of QA and QC departments.  
5. Understand the GLP and its importance.  
6. Describe the warehouse and good warehouse practice.  |
| 55. 17BP607P | Medicinal Chemistry – III Practical | On successful completion of the course the student will  
1. Prepare drugs and medicinally important compounds by traditional and microwave method.  
2. Prepare drug intermediates by traditional and microwave method.  
4. Draw structures of chemicals using softwares.  
5. Determine physicochemical properties for drugs using software.  
| 56. 17BP608P | Pharmacology – III Practical | On successful completion of the course the student will  
1. Calculate the dose in pharmacological experiments.  
2. Perform various pharmacological screening studies.  
3. Demonstrate the toxicity studies in animal models.  
4. Describe the student’s t test, ANOVA, Chi square test, Wilcoxon Signed Rank test.  
5. Determine the pharmacokinetic parameters by using the data.  
6. Evaluate the acute skin irritation, acute eye irritation and corrosion of a test substance.  |
| 57. 17BP609P | Herbal Drug Technology Practical | On successful completion of the course the student will  
1. Perform the preliminary phytochemical screening of crude drugs.  
2. Determine the alcohol content of Asava and Arista.  
3. Evaluate the excipients of natural origin.  
4. Prepare and standardize the creams, lotions and shampoos and syrup.  
5. Explain the Monograph analysis of herbal drugs.  
6. Determine the aldehyde content, Phenol content and total alkaloids.  |
| 58. 16PYU701 | Formulative Pharmacy & Biopharmaceutics – I | On successful completion of the course the student will  
1. Know the various pharmaceutical dosage forms and their manufacturing techniques.  
2. Know various considerations in development of pharmaceutical dosage forms.  
3. Formulate solid and novel drug delivery system.  
4. Know evaluation of pharmaceutical dosage forms.  
5. To understand the criteria for selection of drugs and polymers for the development of Novel |
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<th>Course Code</th>
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<th>Objectives</th>
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<tr>
<td>59. 16PYU702</td>
<td>Advanced Pharmacognosy – I</td>
<td>On successful completion of the course the student will:</td>
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<td>1. Explain the basic principles of extraction and various modern extraction techniques.</td>
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<td>2. Understand the biogenesis of secondary metabolites.</td>
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<td>3. Elaborate the plant-based industries and institutions involved in work on medicinal and aromatic plants in India.</td>
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<td>4. Demonstrate the Industrial production and estimation of Phytoconstituents.</td>
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<td>5. Perform the Herbal formulation and standardization.</td>
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<td>6. Explain the Nutraceuticals.</td>
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<td>60. 16PYU703</td>
<td>Medicinal Chemistry – III</td>
<td>On successful completion of the course the student will:</td>
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<td>1. Describe the isolation of the Phytoconstituents.</td>
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<td>2. Prepare the hair care preparation.</td>
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<td>3. Prepare the skin care the preparation.</td>
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<td>4. Demonstrate the Amino acid by ascending chromatography.</td>
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<td>5. Perform the Thin layer chromatography of Curcumin.</td>
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<td></td>
<td>6. Understand the isolation and formulation procedure.</td>
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<tr>
<td>61. 16PYU704</td>
<td>Pharmacology – III</td>
<td>On successful completion of the course the student will:</td>
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<td>1. Describe the Pharmacology of various endocrine Hormones.</td>
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<td>2. Explain the Insulin, Oral Hypoglycemic agents, Sex hormones, and oral contraceptives.</td>
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<td>3. Enlight the Pharmacology of Drugs acting on the Gastrointestinal Tract.</td>
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<td>4. Brief the principles, methods of Bioassay and the bioassay of insulin, oxytocin, vasopressin, ACTH, histamine and 5-HT.</td>
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<td>5. Explain the Immunopharmacology, Immunostimulants and Immunosuppressants.</td>
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<td>6. Define the drugs acting on the uterus.</td>
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<td>62. 16PYU705</td>
<td>Modern Methods of Pharmaceutical Analysis – I</td>
<td>On successful completion of the course the student will:</td>
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<td>1. Know the principle and applications of instrumentation</td>
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<td>2. Understand the components and working of various analytical instruments.</td>
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<td>3. Understand the different modern techniques of drug analysis.</td>
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<td>4. Appreciate the advantages of instrumental methods of drug analysis.</td>
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<td>5. Understand the principles of volumetric and electro chemical analysis.</td>
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<td>6. Carry out various volumetric and electro chemical titrations.</td>
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<tr>
<td>63. 16PYU711</td>
<td>Formulative Pharmacy &amp;</td>
<td>On successful completion of the course the student will:</td>
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<td>Course Code</td>
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<td>Objectives</td>
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<tr>
<td>16PYU712</td>
<td>Advanced Pharmacognosy Laboratory – I</td>
<td>1. Describe the isolation of the Phytoconstituents.</td>
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<td>2. Prepare the hair care preparation.</td>
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<td>3. Prepare the skin care the preparation.</td>
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<td>4. Demonstrate the Amino acid by ascending chromatography.</td>
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<td>5. Perform the Thin layer chromatography of Curcumin.</td>
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<td>6. Understand the isolation and formulation procedure.</td>
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<tr>
<td>16PYU713</td>
<td>Medicinal Chemistry Laboratory – III</td>
<td>1. Understand the chemistry of drugs with respect to their pharmacological activity.</td>
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<td>2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.</td>
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<td>3. Know the structural activity relationship of different class of drugs.</td>
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<td>4. Write the chemical synthesis of some drug.</td>
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<td>5. Know the Structural Activity Relationship (SAR) of different class of drugs.</td>
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<td>6. Emphasizes on chemical synthesis of important drugs under each class.</td>
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<tr>
<td>16PYU714</td>
<td>Pharmacology Laboratory – III</td>
<td>1. Explain about in-vitro pharmacology and prepare the Physiological salt solutions.</td>
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<td>2. Estimate the bioavailability parameters viz AUC, ( T_{\text{max}} ), ( K_{\text{el}} ) from blood sample.</td>
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<td>3. Demonstrate the CRC of acetylcholine by using suitable muscle preparations.</td>
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<td>4. Estimate the bioavailability parameters viz AUC, ( T_{\text{max}} ), ( K_{\text{el}} ) from urine sample.</td>
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<td>5. Record the CRC of Nor-adrenaline on rat anococcygeus muscle.</td>
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<td>6. Record the CRC of 5HT on rat fundus preparation.</td>
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<tr>
<td>16PYU715</td>
<td>Modern Methods of Pharmaceutical Analysis Laboratory – I</td>
<td>1. Know the principle and applications of instrumentation</td>
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<td>2. Understand the components and working of various analytical instruments.</td>
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<td>3. Understand the different modern techniques of drug analysis.</td>
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<td>4. Appreciate the advantages of instrumental methods of drug analysis.</td>
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<td>Course Title</td>
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<tr>
<td>68.</td>
<td>16PYU7E01</td>
<td>Pharmaceutical Marketing</td>
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<td>69.</td>
<td>16PYU7E02</td>
<td>Pharmaceutical Regulatory Science</td>
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<td>70.</td>
<td>16PYU7E03</td>
<td>Pharmacovigilance</td>
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<td>5.</td>
<td>Explain ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning.</td>
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<td>6.</td>
<td>Describe the CIOMS requirements for ADR reporting, Writing case narratives of adverse events and their quality.</td>
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<td>71.</td>
<td>16PYU7E04 Quality Control and Standardizations of Herbals</td>
<td>On successful completion of the course the student will</td>
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<td></td>
<td>1. Know the Quality assurance in herbal drug industry of GMP.</td>
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<td>2. Know the evaluation techniques for the herbal drugs.</td>
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<td>3. Know the Stability testing of herbal medicines</td>
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<td>4. Explain basic tests for drugs to obtain dosage form for pharmaceutical substances and medicinal plants.</td>
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<td>5. Explain methods for evaluation of pharmaceutical substances, medicinal plants and commercial crude drugs along with WHO guidelines for quality control for herbal drugs.</td>
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<td>6. Describe guidelines for cGMP, GAP, GMP and GLP for quality assurance of herbal drugs in industry.</td>
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<td>72.</td>
<td>16PYU7E05 Cell and Molecular Biology</td>
<td>On successful completion of the course the student will</td>
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<td>1. Understand the importance, evolution and diversity of cells.</td>
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<td>2. Learns to visualize the cells by employing different types of microscopes.</td>
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<td>3. Able to describe the organization, structure and functions of cell organelles.</td>
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<td>4. Understand the biochemical pathways associated with the cellular organelles.</td>
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<td>5. Rationalize different transport mechanisms occurring in the cell.</td>
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<td>6. Understand the cell signalling mechanisms.</td>
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<td>73.</td>
<td>16PYU801 Formulative Pharmacy &amp; Biopharmaceutics – II</td>
<td>On successful completion of the course the student will</td>
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<td></td>
<td></td>
<td>1. Know the various pharmaceutical dosage forms and their manufacturing techniques.</td>
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<td>2. Know various considerations in development of pharmaceutical dosage forms.</td>
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<td>3. Formulate solid and novel drug delivery system.</td>
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<td>4. Know evaluation of pharmaceutical dosage forms.</td>
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<td>5. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.</td>
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<td>6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.</td>
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<td>74.</td>
<td>16PYU802 Advanced Pharmacognosy – II</td>
<td>On successful completion of the course the student will</td>
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<td></td>
<td>1. Explain the basic principles of extraction and various modern extraction techniques.</td>
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<td>2. Understand the biogenesis of secondary metabolites.</td>
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<td>3. Elaborate the plant based industries and institutions involved in work on medicinal and aromatic plants in India.</td>
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<td>4.</td>
<td>Demonstrate the Industrial production and estimation of Phytoconstituents.</td>
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<td>5.</td>
<td>Perform the Herbal formulation and standardization.</td>
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<td>6.</td>
<td>Explain the Nutraceuticals.</td>
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<td>75. 16PYU803</td>
<td>Medicinal Chemistry – IV</td>
<td>On successful completion of the course the student will</td>
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<td></td>
<td>1. Understand the chemistry of drugs with respect to their pharmacological activity.</td>
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<td>2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.</td>
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<td>3. Know the structural activity relationship of different class of drugs.</td>
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<td>4. Write the chemical synthesis of some drug.</td>
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<td>5. Understand the importance of drug design and understand the different modern techniques of drug design.</td>
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<td>6. Know the metabolism- adverse effect and therapeutic value of drugs.</td>
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<td>76. 16PYU804</td>
<td>Pharmacology – IV</td>
<td>On successful completion of the course the student will</td>
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<td></td>
<td>1. Understand the mechanism of drug action and its relevance in the treatment of different diseases.</td>
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<td>2. Comprehend the principles of toxicology and treatment of various poisonings.</td>
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<td>3. Locate and isolate different organs/tissues from the laboratory animals used in pharmacological experiments.</td>
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<td>4. Demonstrate the various receptor actions using isolated tissue preparation.</td>
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<td>5. Appreciate correlation of pharmacology with related medical sciences.</td>
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<td>77. 16PYU805</td>
<td>Modern Methods of Pharmaceutical Analysis – II</td>
<td>On successful completion of the course the student will</td>
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<td>1. Know the principle and applications of instrumentation.</td>
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<td>4. Appreciate the advantages of instrumental methods of drug analysis.</td>
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<td>5. Understand the principles of volumetric and electro chemical analysis.</td>
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<td>6. Carry out various volumetric and electro chemical titrations.</td>
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<td>78. 16PYU811</td>
<td>Formulative Pharmacy &amp; Biopharmaceutics Laboratory – II</td>
<td>On successful completion of the course the student will</td>
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<td>1. Explain the various pharmaceutical dosage forms, their manufacturing techniques and evaluation of pharmaceutical dosage forms.</td>
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<td>2. Know various considerations in development of pharmaceutical dosage forms.</td>
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<td>3. Formulate solid and novel drug delivery system.</td>
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<td>4. To understand the criteria for selection of drugs and polymers for the development of</td>
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</table>
|   | 5. Novel drug delivery systems, their formulation and evaluation  
6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality. |
| 79. | 16PYU812 | Advanced Pharmacognosy Laboratory – II  
On successful completion of the course the student will  
1. Prepare and standardize the Herbal medicine.  
2. Prepare and standardize the Herbal cosmetics.  
3. Perform the Ayurvedic formulation leghya.  
4. Demonstrate the plant tissue culture.  
5. Extract the volatile oils from natural sources.  
6. Isolate the plant enzymes. |
| 80. | 16PYU813 | Medicinal Chemistry Laboratory – IV  
On successful completion of the course the student will  
1. Understand the chemistry of drugs with respect to their pharmacological activity.  
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.  
3. Know the structural activity relationship of different class of drugs.  
4. Write the chemical synthesis of some drug.  
5. Know the Structural Activity Relationship (SAR) of different class of drugs.  
6. Perform assay of medicinal compounds. |
| 81. | 16PYU814 | Pharmacology Laboratory – IV  
On successful completion of the course the student will  
1. Explain about in-vitro pharmacology and prepare the Physiological salt solutions.  
2. Estimate the bioavailability parameters viz AUC, $T_{max}$, $K_{el}$ from blood sample.  
3. Demonstrate the CRC of acetylcholine by using suitable muscle preparations.  
4. Estimate the bioavailability parameters viz AUC, $T_{max}$, $K_{el}$ from urine sample.  
5. Record the CRC of Nor adrenaline on rat anococcygeus muscle.  
6. Record the CRC of 5HT on rat fundus preparation. |
| 82. | 16PYU815 | Modern Methods of Pharmaceutical Analysis Laboratory – II  
On successful completion of the course the student will  
1. Know the principle and applications of instrumentation  
2. Understand the components and working of various analytical instruments.  
3. Understand the different modern techniques of drug analysis.  
4. Appreciate the advantages of instrumental methods of drug analysis.  
5. Understand the principles of volumetric and electro chemical analysis.  
6. Carry out various volumetric and electro chemical titrations. |
| 83. | 16PYU891 | Project Work & Viva Voce  
On successful completion of the course the student will  
1. Work in team and undertake a project in the area of Pharmacy.  
2. Apply concepts of pharmaceutical sciences for executing the project.  
3. Apply appropriate research methodology while formulating a project. |
4. Define specifications, synthesize, analyse, develop and evaluate a project.
5. Present, exhibit and document the project work.
6. Develop a project report.

| 84. | 16PYU8OE01 | Molecular Modelling | On successful completion of the course the student will:
|      |            |                   | 1. Learn various force fields, simulation methods in molecular modelling.
|      |            |                   | 2. Have better understanding on molecular docking and ligand based drug design methods.
|      |            |                   | 3. Recognize the benefits of simulation model studies.
|      |            |                   | 4. Have knowledge of quantum mechanics and molecular mechanics & dynamics.
|      |            |                   | 5. Understand the docking and ligand based drug design methods.
|      |            |                   | 6. Understand and be conversant with the basic principles of molecular modelling.

| 85. | 16PYU8OE02 | Molecular Biology | On successful completion of the course the student will:
|      |            |                   | 1. Have strong understanding of classical genetics.
|      |            |                   | 2. Understand the structure of nucleic acids, transcription, translation and gene regulation.
|      |            |                   | 3. Understand the types of RNA, gene coding, mutation and repair of DNA.
|      |            |                   | 4. Understand the structure of DNA and differentiate the process of replication in prokaryotes and eukaryotes.
|      |            |                   | 5. Understand the structure of nucleic acids and DNA replication.
|      |            |                   | 6. Understand about transcription in prokaryotes and eukaryotes.

| 86. | 16PYU8OE03 | Bioinformatics | On successful completion of the course the student will:
|      |            |                   | 1. Introduction to the basics of sequence alignment and analysis.
|      |            |                   | 2. Overview about biological macromolecular structures and structure prediction methods.
|      |            |                   | 3. To get exposure with the use of database tools.
|      |            |                   | 4. To understand in depth about protein structure prediction.
|      |            |                   | 5. To understand the alignment types like local alignment global alignment.
|      |            |                   | 6. Explain about different types of protein and other organism specific databases.

| 87. | 16PYU8OE04 | Bioprocess Engineering | On successful completion of the course the student will:
|      |            |                   | 1. Help the students to familiarize with various reactors used in bioprocess engineering.
|      |            |                   | 2. Learn analysis of STR and other configurations.
|      |            |                   | 4. Learn about the scale up of bioreactors.
|      |            |                   | 5. Get clear understanding of the fermentation processes.

| 88. | 16PYU8OE05 | Computer Aided Design | On successful completion of the course the student will
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<tr>
<td>1.</td>
<td>Able to organize, summarize, and display quantitative data.</td>
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<td>2.</td>
<td>Comfortable with statistical methods for calculating summary estimates, measures of variability, and confidence intervals.</td>
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<td>3.</td>
<td>Know about parametric design and object representation and geometric modelling.</td>
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<td>4.</td>
<td>Apply the strategies of drug design to develop new molecules with therapeutic activity</td>
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<td>5.</td>
<td>Design new drugs using informatics and databases</td>
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<td>6.</td>
<td>Understand significance and concept of advanced instrumentation</td>
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Name of the Department: **Faculty of Pharmacy**

**Course:** Pharm.D.

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<th>Sl. No.</th>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Outcomes</th>
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| 1.      | 19PD101T    | Human Anatomy and Physiology | On successful completion of the course the student will  
1. Describe the structure (gross and histology) and functions of various organs of the human body.  
2. Describe the various homeostatic mechanisms and their imbalances of various systems.  
3. Identify the various tissues and organs of the different systems of the human body.  
4. Perform the haematological tests and also record blood pressure, heart rate, pulse and respiratory volumes.  
5. Appreciate coordinated working pattern of different organs of each system.  
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body. |
| 2.      | 19PD102T    | Pharmaceutics      | On successful completion of the course the student will  
1. Understand the history of profession of pharmacy.  
2. Understand the basics of different dosage forms.  
3. Understand the professional way of handling the prescription  
4. Prepare various conventional dosage forms.  
5. Develop a clear idea about Pharmaceutical incompatibility and different pharmaceutical calculations in pharmacy.  
6. Predict the instability problems in semi sold dosage forms. |
| 3.      | 19PD103T    | Medicinal Biochemistry | On successful completion of the course the student will  
1. Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.  
2. Know the metabolic process of biomolecules in health and illness (metabolic disorders).  
3. Understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism.  
4. Know the biochemical principles of organ function tests of kidney, liver and endocrine gland.  
5. Do the qualitative analysis and determination of biomolecules in the body fluids.  
6. To know energy rich compounds; ATP, Cyclic AMP and their biological significance. |
| 4.      | 19PD104T    | Pharmaceutical Organic Chemistry | On successful completion of the course the student will |
1. Understand the classification and nomenclature of organic compounds, and the concepts of isomerism.
2. Write the structure, name and the type of isomerism of the organic compound.
3. Schematize the reaction/reaction mechanism and name the reaction.
4. Explain the orientation of reactions.
5. Account for reactivity/stability of compounds.
6. Identify/confirm the organic compounds.

5. 19PD105T Pharmaceutical Inorganic Chemistry
On successful completion of the course the student will
1. Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;
2. Know the analysis of the inorganic pharmaceuticals their applications;
3. Appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.
4. Identify the errors in analysis.
5. Understand the principles of volumetric analysis and electrochemical analysis.
6. Applications of volumetric analysis.

6. 19PD106RMT Remedial Mathematics
On successful completion of the course the student will
1. Understand the partial fraction, logarithms, function and limits.
2. Perform calculations using matrices and determinants.
4. Calculate the equation for straight line and coordinates.
5. Apply differential equations and Laplace transformation for solving problems.
6. Appreciate the important application of mathematics in Pharmacy.

7. 19PD107P Human Anatomy and Physiology Practical
On successful completion of the course the student will
1. Identify epithelial, connective tissue, muscular, nervous tissues microscopically and the axial, appendicular bones.
2. Determine the bleeding time, clotting time.
3. Record the heart rate, pulse rate, blood pressure.
4. Demonstrate the WBC count and RBC count.
5. Identify the axial, appendicular bones.
6. Estimate the blood group and erythrocyte sedimentation rate.

8. 19PD108P Pharmaceutics Practical
On successful completion of the course the student will
1. Understand the professional way of preparing a prescription.
2. Prepare various liquid dosage forms.
3. Prepare various solid dosage forms.
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<td>4.</td>
<td>Perform quality control tests for various dosage forms.</td>
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<td>Acquire the knowledge of using equipment’s in pharmaceutical industry.</td>
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<td>6.</td>
<td>Develop a clear idea about Pharmaceutical incompatibility and different pharmaceutical calculations in pharmacy.</td>
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<td>9.</td>
<td>19PD109P</td>
<td>Medicinal Biochemistry Practical</td>
<td>On successful completion of the course the student will</td>
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<td>1. Qualitatively analyze the biomolecules.</td>
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<td>2. Quantitatively analyze biochemical parameters and their importance in diagnosis of disease.</td>
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<td>3. Systematically analyse the urine for abnormal constituents.</td>
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<td>4. Identify the biomolecules using chemical tests.</td>
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<td>5. Determine the enzymatic activity.</td>
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<td>6. Study the effect of physical parameters on the enzymatic activity.</td>
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<td>10.</td>
<td>19PD110P</td>
<td>Pharmaceutical Organic Chemistry Practical</td>
<td>On successful completion of the course the student will</td>
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<td>1. Systematically perform qualitative analysis of unknown organic compounds.</td>
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<td>2. Detect special elements in an organic sample.</td>
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<td>3. Confirm unknown compounds by m.p./b.p.</td>
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<td>4. Prepare derivatives of organic compounds.</td>
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<td>5. Prepare the solid derivatives from organic compounds.</td>
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<td>6. Construct molecular models.</td>
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<td>11.</td>
<td>19PD111P</td>
<td>Pharmaceutical Inorganic Chemistry Practical</td>
<td>On successful completion of the course the student will</td>
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<td>1. Analyze the limit test for samples.</td>
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<td>2. Prepare the solutions for volumetric and electro-analytical methods.</td>
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<td>3. Standardize the solutions by volumetric and electro-analytical methods.</td>
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<td>4. Perform the assay for chemical substances.</td>
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<td>5. Standardize the titrant used for the assay.</td>
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<td>6. Determine the strength of the solutions by electro-analytical methods.</td>
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