

## FACULTY OF ARTS, SCIENCE AND HUMANITIES

Name of the Department: **Commerce**

Name of the Course : **B.Com**

Sl. No.	Course Code	Name of the Course	Course Outcome
1	19LAU101	Language - I	<ol style="list-style-type: none"><li>1. இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li><li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li><li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li><li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li><li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li></ol>

2	19ENU101	English – I	<ol style="list-style-type: none"> <li>1. Develop the knowledge of interpersonal skills.</li> <li>2. Establish and maintain social relationships.</li> <li>3. Genres of literature will give moral values of life.</li> <li>4. Develop communication skills in business environment</li> <li>5. Communication skills will get developed.</li> <li>6. Develop to have language competence</li> </ol>
3	19CMU101	Financial Accounting	<ol style="list-style-type: none"> <li>1. Comprehend the accounting concepts, principles and to comply the accounting standards.</li> <li>2. Prepare the final accounts and compute inventory valuation.</li> <li>3. Recognize the accounting process of financial statement and critically think in preparing accounts, rectification of errors, Consignment and Joint Venture.</li> <li>4. Acquire knowledge on accounting for branches and also to ascertain the financial position of each branch separately.</li> <li>5. To apply appropriate judgment derived from knowledge of accounting theory to prepare and validate the accuracy of financial statements.</li> <li>6. Apply the accounting procedures for partnership firm</li> </ol>
4.	19CMU102	Business Law	<ol style="list-style-type: none"> <li>1. Identify the basic legal principles behind contractual agreements.</li> <li>2. Understand the relevance of business law in economic and social context.</li> <li>3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.</li> <li>4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.</li> <li>5. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.</li> <li>6. Prepare various agreements related to contract</li> </ol>
5.	19AEC101	Business Communication	<ol style="list-style-type: none"> <li>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</li> <li>2. Draft business correspondence for the organization requirement.</li> <li>3. Prepare business reports for organization needs.</li> <li>4. Use appropriate technology for business communication.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Draft the resume and develop the skills to face the interview</li> <li>6. Use appropriate technology for business communication.</li> </ol>
6.	19LAU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, ‘தமிழ் இலக்கிய வரலாறு’ குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, ‘அறிவியல் தமிழ்’ ; ‘இணைய தமிழ்’ குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
7	19ENU201	English – II	<ol style="list-style-type: none"> <li>1. Learn to enjoy the ecstasy of literature.</li> <li>2. The select literary pieces will develop the confidence level of the learners.</li> <li>3. To get the social values.</li> <li>4. To know the importance of communication</li> <li>5. Get sound knowledge in English</li> <li>6. Trained to communicate well for business purpose.</li> </ol>

8	19CMU201	Corporate Accounting	<ol style="list-style-type: none"> <li>1. Comprehend and apply the accounting process related corporate accounting</li> <li>2. Prepare final accounts for corporate entity.</li> <li>3. Understand the accounting standard and apply the same for corporate entity and amalgamation.</li> <li>4. Understand the difference of banking balance sheet and non-banking balance sheet</li> <li>5. Enhance the problem-solving skills and analytical skills in the accounting context.</li> <li>6. Enhance the facts on issue and redemption of share capitals</li> </ol>
9	19CMU202	Business Mathematics and Statistics	<ol style="list-style-type: none"> <li>1. Utilize the concept of matrices, differential calculus to solve business problems</li> <li>2. Calculate and apply the measure of central tendency and dispersion in decision making.</li> <li>3. Evaluate the relationship and association between variables to formulate the strategy in business.</li> <li>4. Apply the concept of index numbers and trend analysis in business decisions.</li> <li>5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.</li> <li>6. To overcome on issues in the construction of index numbers</li> </ol>
10	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Understand the ecosystem and its impact on human beings.</li> <li>2. Preserve the non – renewable energy and effectively utilize the renewable energy.</li> <li>3. Avoid the threats to biodiversity habitat loses.</li> <li>4. Prevent pollution in the environment</li> <li>5. Apply the laws relevant to the environment conservation</li> <li>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</li> <li>7. Understand the ecosystem and its impact on human beings.</li> </ol>

11	18ENU301	English – III	<ol style="list-style-type: none"> <li>1. Students learnt the basics and purposes of listening skill.</li> <li>2. Students will know the importance of speaking.</li> <li>3. Students developed the speaking skills on telephone, business and also in travel</li> <li>4. Learnt some effective vocabulary learning strategies.</li> <li>5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.</li> <li>6. Students will have honed the skills of communication which is needed for business purpose.</li> </ol>
12	18CMU301	Cost Accounting	<ol style="list-style-type: none"> <li>1. Understand the cost concepts, types of costing methods and book keeping for cost accounting</li> <li>2. Apply tools and techniques to calculate cost and solve the problems.</li> <li>3. Select the best methods of costing by critically analyzing and apply the same to appropriate situation</li> <li>4. Communicate orally and in written the cost concepts</li> <li>5. Gain the lifelong learning of cost concepts and apply in the business environment.</li> <li>6. Reconcile Cost and Financial Accounting.</li> </ol>
13	18CMU302	Income Tax Law and Practice	<ol style="list-style-type: none"> <li>1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.</li> <li>2. Compute Income Tax Returns.</li> <li>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</li> <li>4. Communicate orally and in written the Income tax computation under various income heads and deductions.</li> <li>5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.</li> <li>6. Prepare a statement of income for a person.</li> </ol>

14	18CMU303A	Auditing and Corporate Governance	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of auditing, corporate governance and Corporate social responsibility (CSR)</li> <li>2. Recall the audit techniques, corporate governance and CSR practices.</li> <li>3. Apply lifelong the key learning of best auditing process, Corporate governance and CSR practices</li> <li>4. Communicate orally and in written form the auditing concept and techniques, Corporate governance and CSR concepts and practices in business.</li> <li>5. Familiar with the standards and laws pertaining to the auditing, Corporate Governance and CSR.</li> <li>6. Reminiscence with statistics on global reporting.</li> </ol>
15	18CMU303B	Computerised Accounting System	<ol style="list-style-type: none"> <li>1. Comprehend on the knowledge of Tally, its features and its importance.</li> <li>2. Communicate orally and in written form the Features of Tally in capturing accounting procedures.</li> <li>3. Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.</li> <li>4. Familiarize on the incorporation of GST standards into accounting and computerized accounting process.</li> <li>5. Integrate accounting concepts and computer for effective decision making.</li> <li>6. Practical application of tally concepts in organizations.</li> </ol>
16	18CMU311A	Auditing and Corporate Governance (practical)	<ol style="list-style-type: none"> <li>1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.</li> <li>2. Classify and apply vouching, verification and valuation technique to appropriate situation</li> <li>3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.</li> <li>4. Communicate orally and in written form about the findings and solution.</li> <li>5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.</li> <li>6. Reminiscence with statistics on global reporting.</li> </ol>

17	18CMU311B	Computerised Accounting System (practical)	<ol style="list-style-type: none"> <li>1. Familiarize on the accounts heads, vouching, inventory valuations, TDS and Pay roll process available in the accounting software</li> <li>2. Classify the items under items heads</li> <li>3. Generate the financial Reports, TDS and pay roll reports and evaluate the output.</li> <li>4. Communicate the outputs in written form identifying the objective and outcome of each exercise.</li> <li>5. To apply the utilization of computerised system as a lifelong learning..</li> <li>6. Practical application of tally concepts in organizations.</li> </ol>
18	18ENU401	English – IV	<ol style="list-style-type: none"> <li>1. Students have acquired proficiency in communication.</li> <li>2. Students have become adept in written communication and presentation skills.</li> <li>3. Practice the skill of writing in English and that of public speaking.</li> <li>4. Establish and maintain social relationships.</li> <li>5. Develop communication skills in business environment.</li> <li>6. Refine communication competency through LSRW skills.</li> </ol>
19	18CMU401	Research Methodology	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>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.</li> <li>3. Critically formulate the research design and sampling design suitable for the problem.</li> <li>4. Communicate orally and written for the research problem, research design, sampling techniques.</li> <li>5. Design a report to communicate the findings.</li> <li>6. Provide suggestion to make business decision</li> </ol>
20	18CMU402	Indirect Taxation	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.</li> <li>2. Comprehend and compute GST liabilities.</li> <li>3. Know the procedure to register GST and apply GST provisions to business situations.</li> <li>4. Communicate orally and in written form the indirect taxations concepts and provisions.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application.</li> <li>6. Application of GST provisions for business concerns.</li> </ol>
21	18CMU403A	Financial Analysis and Reporting	<ol style="list-style-type: none"> <li>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</li> <li>2. Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>3. Critically evaluate the results of the tools applied, interpret the result.</li> <li>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>5. Preparation of statement of cash and fund flow.</li> <li>6. Preparation of Cash flow and fund flow statements</li> </ol>
22	18CMU403B	Excel for Business	<ol style="list-style-type: none"> <li>1. Utilize application of spreadsheet for business reporting purpose.</li> <li>2. Understand the features of Spreadsheet applications and functions.</li> <li>3. Comprehend and apply computer tools and inbuilt functions on raw data.</li> <li>4. Communicate orally and in written form the features of spreadsheet applications and functions.</li> <li>5. Utilize the expertise of the Excel features and functions as a lifelong practice.</li> <li>6. Use shortcut methods in spreadsheet</li> </ol>
23	18CMU411	Research Methodology (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>2. Analyse the research problem and design the instruments to capture data</li> <li>3. Analyse the same using appropriate statistical techniques, and apply the learning lifelong.</li> <li>4. Critically evaluate the appropriate scales and measurement to be used for capturing data.</li> <li>5. Communicate in written form and prepare report to support decision making.</li> <li>6. Work in team and exhibit leadership skills</li> </ol>

24	18CMU412	Indirect Taxation (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.</li> <li>2. Know the procedure to register GST and apply GST provisions to business situations.</li> <li>3. Communicate orally and in written form the indirect taxations concepts and provisions.</li> <li>4. Familiar with the standards and laws pertaining GST and customs and apply the knowledge lifelong.</li> <li>5. Application of GST provisions for business concerns.</li> <li>6. Comprehend and compute GST liabilities.</li> </ol>
25	18CMU413A	Financial Analysis and Reporting (Practical)	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>3. Critically evaluate the results of the tools applied, interpret the result.</li> <li>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>5. Utilize the knowledge of financial statement analysis for lifelong.</li> <li>6. Preparation of statement of cash and fund flow.</li> </ol>
26	18CMU413B	Excel for Business (Practical)	<ol style="list-style-type: none"> <li>1. Create and format the data in excel sheet</li> <li>2. Utilize all the inbuilt, functions and formulas and analyse the data.</li> <li>3. Critically analyse the data using the what-if, solver and pivot functions.</li> <li>4. Communicate the outputs in written form identifying the objective and outcome of each exercise.</li> <li>5. Apply the practice of utilization of spreadsheets lifelong learning for data analysis and decision making.</li> <li>6. Use shortcut methods in spreadsheet</li> </ol>
27	17CMU501A	Human Resource Management	<ol style="list-style-type: none"> <li>1. Understand the HR environment in India and human resource functions within organizations</li> <li>2. .Plan human resources requirement and formulate HR policy of the organisation with regard to recruitment, selection, training and career planning.</li> <li>3. Appraise the employee's performance and formulate compensation policy which helps to make organizational excellence.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Understand the importance of career planning, job evaluation and factors influencing compensation levels.</li> <li>5. Analyse the ethical issues in HR management</li> <li>6. To take decisions in a manner of Collective Bargaining.</li> </ol>
28	17CMU501B	Indirect Tax Law	<ol style="list-style-type: none"> <li>1. Understand the Concept of indirect taxes emphasizing VAT and customs law.</li> <li>2. Learn and compute the Taxation under the constitution.</li> <li>3. Know how to register CST and apply the CST provisions.</li> <li>4. Communicate orally and in written form the indirect taxations concepts and provisions.</li> <li>5. Be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.</li> <li>6. To have an understanding of custom duties</li> </ol>
29	17CMU502A	Principles of Marketing	<ol style="list-style-type: none"> <li>1. Understand the Concept of marketing, and 4Ps of Marketing</li> <li>2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing</li> <li>3. Apply the marketing concepts and skills lifelong.</li> <li>4. Apply the marketing strategies of a company's effectively.</li> <li>5. To be familiar in behavior of consumer in related to market and to take decision effectively.</li> <li>6. To implement the correct promotion strategies.</li> </ol>
30	17CMU502B	Banking and Insurance	<ol style="list-style-type: none"> <li>1. Understand the Concept of banking operations, functions, risk associated with and law pertaining to banking functions,</li> <li>2. Comprehend on the Indian banking system, its regulatory body and key macro indicators related to banks that affect the economy.</li> <li>3. Communicate orally and in written form the understanding of banking operations, functions, risk associated with and law pertaining to banking functions</li> <li>4. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.</li> <li>6. To be familiar in accessing different forms of Internet Banking globally and able to access its benefit</li> </ol>
31	17CMU503A	Entrepreneurship	<ol style="list-style-type: none"> <li>1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>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.</li> <li>3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>5. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
32	17CMU503B	Advertising	<ol style="list-style-type: none"> <li>1. Knowing the concepts of advertising.</li> <li>2. Getting the details about the various types of advertising</li> <li>3. Understanding the motivational aspects of salesmen</li> <li>4. Understanding the concept of sales force management</li> <li>5. Knowing about the social effects of advertising</li> <li>6. Knowing about the promotional strategy.</li> </ol>

33	17CMU504A	Principles of Micro Economics	<ol style="list-style-type: none"> <li>1. Apply the demand and supply concept in managerial decisions</li> <li>2. Formulate the pricing strategies based on the market structure</li> <li>3. gain knowledge on the market structure and price determination</li> <li>4. understand the importance of macroeconomic indicators like National income, GDP, Inflation etc.</li> <li>5. Understand the concepts of Monetary policy, Balance of payment and Money supply</li> <li>6. understand the impact of monetary policy, money supply and Balance of payments on running a business.</li> </ol>
34	17CMU504B	Business Ethics	<ol style="list-style-type: none"> <li>1. Making the concept, process and importance of Business ethics.</li> <li>2. Gaining the knowledge on Ethical Issues in Human Resource Management</li> <li>3. Improving the ethical behaviour of business, Ethical Issues in Marketing Strategy</li> <li>4. Giving the basics of communication reports, tenders and various correspondence of a company.</li> <li>5. Understanding the concept of Ethical Issues in Finance</li> <li>6. Imparting the students with enhanced Corporate Social Responsibility (CSR)</li> </ol>
35	17CMU511A	Principles of Marketing- Practical	<ol style="list-style-type: none"> <li>1. Helping the students to get in-depth knowledge on Marketing Segmentation</li> <li>2. Helping to know about the proper Distribution channels</li> <li>3. Helping the students to identify the media of Advertisement</li> <li>4. Preparing and Presenting the Development of Market Segmentation for any FMGC products</li> <li>5. Giving a Presentation of the Selection of distribution channel for Baby Product</li> <li>6. To Present in which media of Advertisement will you select for Cosmetic products</li> </ol>
36	17CMU511B	Banking and Insurance - Practical	<ol style="list-style-type: none"> <li>1. Imparting the knowledge about the basic principles of the banking and insurance</li> </ol>

			<ol style="list-style-type: none"> <li>2. Preparing various types of accounts forms and deposits of commercial banks.</li> <li>3. Preparing the Application forms for opening accounts, Cheque Books, pass books, requisition slips for withdrawals and deposits, bank statements, format of Demand draft, Cheque, travel cheques etc.</li> <li>4. Collecting the format of proposal form of different kinds of insurance and learn the process of filling them</li> <li>5. Visiting the any insurance office and collect the details of its Organizational Structure</li> <li>6. Collecting the various types of the Proposal Forms of insurance.</li> </ol>
37	17CMU601A	Management Accounting	<ol style="list-style-type: none"> <li>1. Explain nature and scope of management accounting</li> <li>2. Evaluate Costing systems, cost management systems, budgeting systems and performance measurement systems</li> <li>3. Extend Classification of ratios, capital structure and leverage.</li> <li>4. Analysis performance evaluation applications of management accounting.</li> <li>5. Prepare management reports by using funds flow and cash flow statement.</li> <li>6. Prepare the Financial Statement under the defined Accounting standard.</li> </ol>
38	17CMU601B	Computer Application in Business	<ol style="list-style-type: none"> <li>1. Studying the basics of Computer Networks.</li> <li>2. Providing computer skills and knowledge for commerce students and to enhance the Student understands of usefulness of information technology tools for business operations.</li> <li>3. Learning the concept of Word Processing and Printing Documents.</li> <li>4. Preparing the Presentations with Creating Business Presentations using above facilities</li> <li>5. Understanding the principles of creating Spreadsheet and its Business Applications</li> <li>6. Developing the skills in analyzing the usability of a website.</li> </ol>

39	17CMU602A	Office Management and Secretarial Practices	<ol style="list-style-type: none"> <li>1. Understanding the concept office and office management.</li> <li>2. Knowing the different finance sources of business and location of the business.</li> <li>3. Familiarizing the students with the activities in a modern office</li> <li>4. Imparting the students about the working environment, the tools and equipment's used in office.</li> <li>5. Understanding the concept and procedure about banking facilities.</li> <li>6. demonstrating the importance and functions of Modern Office Equipments.</li> </ol>
40	17CMU602B	Fundamentals of Investment	<ol style="list-style-type: none"> <li>1. Understanding the Concept and procedures of fundamentals of investment.</li> <li>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.</li> <li>3. Knowing the concept of various types of bonds/</li> <li>4. Evaluate the appropriate alternatives techniques for Portfolio Analysis and Financial Derivatives</li> <li>5. Communicate in oral and written form of Technical Analysis and Efficient Market</li> <li>6. Understand the concept and Role of SEBI and Stock Exchanges in Investor Protection</li> </ol>
41	17CMU603A	Personal Selling and Salesmanship	<ol style="list-style-type: none"> <li>1. Understand the Concept of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</li> <li>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.</li> <li>3. Apply the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and controlling lifelong practice.</li> <li>4. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> </ol>

42	17CMU603B	Consumer Protection	<ol style="list-style-type: none"> <li>1. Familiarizing the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights .</li> <li>2. Comprehending the business firms' interface with consumers and the consumer related regulatory and business environment.</li> <li>3. Understanding the Consumer Protection Act, 1986 (CPA)and their Objectives and Basic Concepts.</li> <li>4. Understanding the concept of Grievance Redress Mechanism under the Consumer Protection Act, 1986.</li> <li>5. Familiarizing the students with the concept of Grievance Redress Mechanism under the Consumer Protection Act, 1986.</li> <li>6. Understanding the concept of Industry Regulators and Consumer Complaint Redress Mechanism.</li> </ol>
43	17CMU604A	Indian Economy	<ol style="list-style-type: none"> <li>1. Enabling the student to grasp the major economic problems in India and their solutions.</li> <li>2. Providing an understanding of modern tools of macro-economic analysis and policy framework</li> <li>3. Enlightening the students knowledge in Basic Issues and features of Indian Economy.</li> <li>4. Communicating orally and in written form Concept of Sectoral Trends and Issues.</li> <li>5. Having in-depth knowledge on Policies for restructuring agrarian relations and for regulating concentration of economic power.</li> <li>6. Understanding the importance of Inflation, Unemployment and Labour market.</li> </ol>
44	17CMU604B	Retail Management	<ol style="list-style-type: none"> <li>1. Understand the features of Retailing.</li> <li>2. Knowledge in the theories of Retail Development</li> <li>3. Knowledge in global Retail Markets.</li> <li>4. Communicate orally and in written form Concept of management in retail business.</li> <li>5. Implement the right retail strategies to make success the retail business.</li> <li>6. Follow and take decisions related to Servicing the Retail Customer</li> </ol>

45	17CMU611A	Management Accounting - Practical	<ol style="list-style-type: none"> <li>1. Preparing various types of inventory statements</li> <li>2. Preparing the bank reconciliation statement</li> <li>3. Preparing the various types of ratio analysis</li> <li>4. Preparing the Cash flow statement and Fund flow statement</li> <li>5. Creating the stock group and stock items and enter the vouchers</li> <li>6. Preparing the various types of reports</li> </ol>
46	17CMU611B	Computer Application in Business – Practical	<ol style="list-style-type: none"> <li>1. Knowing the MS-word usage and its commands</li> <li>2. Familiar with MS-Excel and its function</li> <li>3. Aware of the MS-power point</li> <li>4. Knowing about the usage of MS-Access.</li> <li>5. Preparing documents and reports for the organization</li> <li>6. Preparing presentation for business meetings.</li> </ol>

Name of the Department: **Commerce**

Name of the Course: **M.Com**

<b>Sl. No.</b>	<b>Course Code</b>	<b>Name of the course</b>	<b>Course Outcome</b>
1	19CMP101	Managerial economics	<ol style="list-style-type: none"><li>1. Apply the economic way of thinking to individual decisions and business decisions</li><li>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,</li><li>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</li><li>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.</li><li>5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</li><li>6. Understand and exhibit the Market Competition and Price structures</li></ol>
2	19CMP102	Managerial accounting	<ol style="list-style-type: none"><li>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</li><li>2. Comprehend on the contemporary issues relevant to accounting concepts.</li><li>3. Analyse the alternatives using appropriate tools and techniques.</li><li>4. Solve the problems and take decisions based on the result.</li><li>5. Communicate orally and in written form the concepts and solutions.</li><li>6. Realize the preparation of Budget</li></ol>
3	19CMP103	Statistical analysis	<ol style="list-style-type: none"><li>1. Understand the basic statistical tools and techniques and its application in business decision making.</li></ol>

			<ol style="list-style-type: none"> <li>2. Perform basic statistical estimation and hypothesis testing for interpret the results.</li> <li>3. Know how to specify, estimate, and use statistical models to predict and obtain reliable forecasts.</li> <li>4. Develop an ability to analyse and interpret the collected data to provide meaningful information in making management decisions</li> <li>5. Understand the Aggregate expenditure method</li> <li>6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the discipline of statistics.</li> </ol>
4.	19CMP104	Advanced corporate accounting	<ol style="list-style-type: none"> <li>1. Understand the international Reporting standards and its importance</li> <li>2. Prepare the accounts for holding company.</li> <li>3. Formulate accounts for corporate restructuring, liquidation and prepare the Voyage accounts</li> <li>4. Understand the importance of Human Resource Accounting and Price level changes.</li> <li>5. Demonstrate</li> <li>6. Demonstrate capabilities</li> </ol>
5.	19CMP105A	Indian financial system	<ol style="list-style-type: none"> <li>1. Understand the Indian financial markets its contribution to economy.</li> <li>2. Know the role of regulatory bodies in regulating the financial system and its intermediaries.</li> <li>3. Realize the concept and applications of money market,</li> <li>4. Realize the concept and applications of financial markets,</li> <li>5. Realize the concept and applications of financial institutions and its holistic contribution to financial system functioning.</li> <li>6. Demonstrate capabilities of critical thinking, and communication skills related to the Indian financial system.</li> </ol>
6.	19CMP105B	Organizational behaviour	<ol style="list-style-type: none"> <li>1. Analyse behavior issues in the context of the organizational behavior theories and concepts.</li> <li>2. Assess the behavior of the individuals and groups in organization by applying personality, motivation and learning theories.</li> <li>3. Manage team and resolve conflict arising between the members.</li> <li>4. Explain how organizational change and culture affect working relationships within organizations.</li> <li>5. Realize the Individual Behaviour and Personality</li> <li>6. Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</li> </ol>
7	19CMP105C	Consumer behaviour	<ol style="list-style-type: none"> <li>1. Understand the importance of Culture, Subculture, Social Class, Reference Groups and Family Influences in Consumer Behaviour.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Explore, analyse and compare the core theories of consumer behaviour and its application in both consumer and organizational markets</li> <li>3. Appraise models of Consumer Behaviour and determine the irrelevance to particular marketing situations</li> <li>4. Critique the theoretical perspectives associated with consumer decision making, including recognising cognitive biases and heuristics</li> <li>5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to investment decisions.</li> <li>6. Demonstrate capabilities of External Influences on Consumer Behaviour</li> </ol>
8	19CMP106	Corporate law	<ol style="list-style-type: none"> <li>1. Identify the basic legal principles behind Corporate Incorporation and Management, Oppression &amp; Mismanagement and Investigation, Corporate Liquidation, Corporate Governance and CSR and its application.</li> <li>2. Understand the relevance of corporate law in economic and social context.</li> <li>3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in corporate.</li> <li>4. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment related to corporate.</li> <li>5. To communicate orally and in written format the corporate law.</li> <li>6. Online registration and online filing process of documents</li> </ol>
9	19CMP111	Computer application for accounting (practical)	<ol style="list-style-type: none"> <li>1. Understand the different accounting heads and its importance</li> <li>2. Create vouchers and ledgers by understanding the reason for posting under different heads</li> <li>3. Calculate valuation of assets using the software</li> <li>4. Prepare the financial statements and analyse the financial statement using the option of ratio analysis</li> <li>5. Exhibit communication skills to communicate the output derived from the program.</li> <li>6. Preparing the various types of reports</li> </ol>

10	19CMP201	Corporate finance	<ol style="list-style-type: none"> <li>1. Understand the role of a financial manager, and their role in taking decisions professionally</li> <li>2. Demonstrate knowledge and compute value of money over time and apply the concept to Evaluate the business proposal applying capital budgeting techniques</li> <li>3. Compute the cost of capital and financial leverage to estimate the optimal capital structure.</li> <li>4. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.</li> <li>5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions.</li> <li>6. Apply the concept to Evaluate the business proposal applying capital budgeting techniques</li> </ol>
11	19CMP202	Operations research	<ol style="list-style-type: none"> <li>1. Understand the principles and techniques of Operations Research and their applications in decision-making.</li> <li>2. Formulate linear programming (LP) models and understand the cost minimization and profit maximization concepts.</li> <li>3. Apply mathematical methods for large-scale transportation, assignment models and inventory models.</li> <li>4. Realize and apply mathematical techniques in getting the best possible solution to a problem involving limited resources.</li> <li>5. Demonstrate capabilities of team work, problem-solving, critical thinking, and communication skills.</li> <li>6. course concentrates on Linear programming, transportation model, Queuing theory and Inventory</li> </ol>

12	19CMP203	Applied cost accounting	<ol style="list-style-type: none"> <li>1. Explain the core concepts of costing, costing types and its importance in managing a business</li> <li>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</li> <li>3. Compute using different costing methods.</li> <li>4. Demonstrate capabilities of teamwork, problem-solving and critical thinking</li> <li>5. Communication skills related to finance decisions.</li> <li>6. Reconcile Cost and Financial Accounting.</li> </ol>
13	19CMP204	Financial markets and institutions	<ol style="list-style-type: none"> <li>1. Comprehend on the concept financial markets, instruments and financial institution and its role in economic development</li> <li>2. Understand the regulatory bodies governing the functioning of financial markets and financial institution</li> <li>3. Obtain the capacity to do lifelong learning on financial markets, instruments, financial institution and its applications.</li> <li>4. To communicate orally and in written format about the financial markets and institutions</li> <li>5. The course includes Money Market, Money Market Instruments, Capital Market, Depository System and various types of Financial Institutions</li> <li>6. Course includes Money Market, Money Market Instruments, Capital Market, Depository System and various types of Financial Institutions</li> </ol>
14	19CMP205A	Security analysis and portfolio management	<ol style="list-style-type: none"> <li>1. Choose the appropriate investment avenues based on the individual risk return profile</li> <li>2. Calculate the intrinsic value and evaluate the performance based on risk-return</li> <li>3. Select the security based on the fundamental and technical analytical tools</li> <li>4. Evaluate the performance of the portfolio using the different measures</li> <li>5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to investment decisions.</li> <li>6. Demonstrate capabilities of diversification risk</li> </ol>

15	19CMP205B	Human resource management	<ol style="list-style-type: none"> <li>1. Assess the job analysis for a profile and understand its linkage with HR planning</li> <li>2. Evaluate the training needs and draft a training programme.</li> <li>3. Understand the compensation and reward system applicable to the industry based and understand its linkage with performance management</li> <li>4. Understand and apply the appropriate employee relations measures.</li> <li>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.</li> <li>6. consists of Job Analysis, Job Evaluation, Orientation, Performance Appraisal, Rewards, Punishment, Industrial Relations, Collective Bargaining and Grievances Handling</li> </ol>
16	19CMP205C	Advertising and sales promotions	<ol style="list-style-type: none"> <li>1. Knowing the concepts of advertising.</li> <li>2. Getting the details about the various types of advertising</li> <li>3. Understanding the motivational aspects of salesmen</li> <li>4. Understanding the concept of sales force management</li> <li>5. Knowing about the social effects of advertising</li> <li>6. Knowing about the promotional strategy.</li> </ol>
17	19CMP206	Direct taxation	<ol style="list-style-type: none"> <li>1. Comprehend on the concepts related to assessment, assesse , Income heads and the Income Tax laws.</li> <li>2. Compute Income Tax Returns.</li> <li>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</li> <li>4. Communicate orally and in written the Income tax computation under various income heads and deductions.</li> <li>5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.</li> <li>6. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.</li> </ol>
18	19CMP211	Advanced excel for business (practical)	<ol style="list-style-type: none"> <li>1. Apply advanced formulas to lay data in readiness for financial analysis</li> <li>2. Use advanced techniques for financial report visualizations</li> </ol>

			<ol style="list-style-type: none"> <li>3. Leverage on various methodologies of summarizing financial data</li> <li>4. Understand and apply Sensitivity (“What-if”) analysis models like Goal Seek ,</li> <li>5. Understand and apply Scenarios; Excel models for financial decision-making</li> <li>6. Exhibit communication skills to communicate the output derived from the program.</li> </ol>
19	18CCP301	Software models and engineering	<ol style="list-style-type: none"> <li>1. Understand the concept of software engineering, software requirements and software project management.</li> <li>2. Apply the concept in software project management.</li> <li>3. Understand and apply the metrics to successfully plan and implement the software project.</li> <li>4. Communicate orally and in written form the application of the understanding of software engineering,</li> <li>5. Communicate orally and in written form the application of the understanding of software requirements</li> <li>6. Communicate orally and in written form the application of the understanding of software project management.</li> </ol>
20	18CCP302	Business research methods and techniques	<ol style="list-style-type: none"> <li>1. Assess the best suitable research type and formulate the research objective for the business problem.</li> <li>2. Formulate the suitable research designs and select appropriate sampling techniques for the research.</li> <li>3. Select the appropriate data collection method for solving the business issue</li> <li>4. Decide the appropriate measurement scale for designing the instrument for data collection.</li> <li>5. Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.</li> <li>6. 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.</li> </ol>
21	18CCP303	Indirect taxation	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.</li> <li>2. Comprehend and compute GST liabilities.</li> <li>3. Know the procedure to register GST and apply GST provisions to business situations.</li> <li>4. Communicate orally and in written form the indirect taxations concepts and provisions.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application.</li> <li>6. Know the concept of input tax credit mechanism</li> </ol>
22	18CCP304	Vb. Net	<ol style="list-style-type: none"> <li>1. Understand the Concept of Visual Basics.Net and its application.</li> <li>2. Learn tools and utilize the tools of Visual Basic.net to design programmes.</li> <li>3. Communicate orally and in written form the Concept of Visual Basics.Net and its application.</li> <li>4. Know the Visual Basic Language and Loops</li> <li>5. Know the Object-Oriented Programming</li> <li>6. Exhibit the Menus and Dialog-Boxes</li> </ol>
23	18CCP305A	Mergers, acquisitions and corporate restructuring	<ol style="list-style-type: none"> <li>1. Understand the Concept mergers, Demergers, LBO, MBO, JV its valuation and accounting.</li> <li>2. Compute, analyse and evaluate the corporate restructuring decisions and its impact on company.</li> <li>3. Know the Legal and Regulatory Framework of M &amp; A and Post Merger Integration</li> <li>4. Know the concept of Amalgamation</li> <li>5. Know the concept Joint Ventures and Takeovers</li> <li>6. Exhibit the concept of Corporate Restructuring</li> </ol>
24	18CCP305B	Business valuation	<ol style="list-style-type: none"> <li>1. Understand the valuation concepts, valuation techniques and its application in valuing the assets.</li> <li>2. Compute, analyze and evaluate the value of the assets applying the appropriate techniques.</li> <li>3. Communicate orally and in written form the understanding of valuation concepts, valuation techniques and its application in valuing the assets.</li> <li>4. Know the Valuation of Goodwill Patents and Copyrights</li> <li>5. Know the Valuation of Fixed Assets</li> <li>6. Valuation of Financial Options</li> </ol>
25	18CCP305C	Accounting for decision making	<ol style="list-style-type: none"> <li>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</li> <li>2. Comprehend on the contemporary issues relevant to accounting concepts.</li> <li>3. Analyse the alternatives using appropriate tools and techniques.</li> <li>4. Solve the problems and take decisions based on the result.</li> <li>5. Communicate orally and in written form the concepts and solutions.</li> <li>6. Realize the preparation of Budget</li> </ol>
26	18CCP311	Vb.net (practical)	<ol style="list-style-type: none"> <li>1. Implement Object Oriented Programming Concepts</li> <li>2. Use and create packages and interfaces in a VB.Net</li> <li>3. Use graphical user interface</li> </ol>

			<ol style="list-style-type: none"> <li>4. Exhibit communication skills to communicate the output derived from the program.</li> <li>5. Understand the date and time handling functions</li> <li>6. Exhibit to develop an application to create inventory management system</li> </ol>
27	18CCP312	Spss (practical)	<ol style="list-style-type: none"> <li>1. Create datasheet and enter the data</li> <li>2. Compute descriptive statistics using the package and graphically represent the data.</li> <li>3. Perform univariate and bivariate analysis in the software package.</li> <li>4. Perform multivariate analysis in the software package.</li> <li>5. Perform the correlation analysis</li> <li>6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output</li> </ol>
28	18CCP401	Digital marketing	<ol style="list-style-type: none"> <li>1. Understand the Concept of Digital marketing and digital marketing tools.</li> <li>2. Learn tools and utilize the tools of digital marketing</li> <li>3. Understand the linkage of digital marketing and analytics</li> <li>4. Exhibit the concept of Online Reputation Management</li> <li>5. Understand the Online Marketing Tools</li> <li>6. Communicate orally and in written form the Concept of Digital marketing and digital marketing tools</li> </ol>
29	18CCP402	Entrepreneurial development	<ol style="list-style-type: none"> <li>1. Understanding the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>2. Communicating orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>3. Applying the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>4. Initiating the required skills for entrepreneurial development.</li> <li>5. Helping students understand the process of establishing and developing an enterprise</li> <li>6. Making the students Small Business as seed bed of Entrepreneurship</li> </ol>
30	18CCP411	Digital marketing (practical)	<ol style="list-style-type: none"> <li>1. Understand the Concept of Digital marketing and digital marketing tools.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Learn tools and utilize the tools of digital marketing</li> <li>3. Understand the linkage of digital marketing and analytics</li> <li>4. Exhibit the concept of Online Reputation Management</li> <li>5. Understand the Online Marketing Tools</li> <li>6. Communicate orally and in written form the Concept of Digital marketing and digital marketing tools</li> </ol>
31	18CCP491	Project	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</li> <li>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</li> <li>4. Apply the theoretical and practical learning of doing research into lifelong practice.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> </ol>

Name of the Department: **Biochemistry**

**Course:** B.Sc. Biochemistry

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LSU101	Language -I	<ol style="list-style-type: none"><li>இந்தியகுடியுரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப்பாடமாக இடம் பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li><li>கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனைமேம்பாடு.</li><li>வேலைவாய்ப்புக்குரிய சுயதிறன்மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li><li>சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப்பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li><li>மொழி பெயப்புத்துறை சார்ந்த வேலை வாய்புத்திறன்பெற்றிருத்தல்.</li></ol>
2.	19ENU101	English	<ol style="list-style-type: none"><li>Develop the knowledge of interpersonal skills</li><li>Establish and maintain social relationships</li><li>Genres of literature will give moral values of life</li><li>Develop communication skills in business environment</li><li>Communication skills will get developed</li><li>Develop to have language competence</li></ol>
3.	19BCU101	Molecules of Life	<ol style="list-style-type: none"><li>Recognize water as a universal solvent and elixir of life by knowing its importance</li><li>Identify the properties and classification of carbohydrates</li><li>Recall the role of various lipids in bio-membrane including signal transduction</li><li>Categorize the amino acids and know their properties</li><li>Differentiate the structure, properties and functions of DNA and RNA</li><li>List the functions and deficiency disease of fat and water soluble vitamins</li></ol>
4.	19BCU102	Cell biology	<ol style="list-style-type: none"><li>Differentiate the prokaryotic and eukaryotic cell</li><li>Understand the principle behind studying the cell morphology using various microscope</li><li>Identify the structure and functions of each organelle in cell</li></ol>

			<ol style="list-style-type: none"> <li>Recognise the mechanism behind the protein sorting and transport to their destinations like lysosome, mitochondria and chloroplast</li> <li>Maintenance of cytoskeleton structure and function of micro, macro and intermediary filaments</li> <li>Enumerate the phases of cell cycle, events in cell division and mechanism of cell death</li> </ol>
5.	19BCU103	Chemistry-I	<ol style="list-style-type: none"> <li>Understand the molecular orbital theory, preparation and properties of inorganic compounds</li> <li>Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds</li> <li>Have knowledge about important industrial chemicals like silicones, fuel gases</li> <li>Know the classes of fertilizers and their impact on environment</li> <li>Understand the elements of photochemistry, chemical kinetics and chromatography.</li> <li>Understand about the dyes, chemotherapy and vitamins</li> </ol>
6.	19BCU111	Molecules of Life- Practical	<ol style="list-style-type: none"> <li>Gain knowledge on lab safety</li> <li>Prepare reagents and solutions</li> <li>Understand the basis of buffer preparation</li> <li>Understand the principle and working procedure behind chromatographic separations</li> <li>Understand the principle and working procedure behind staining techniques</li> <li>Understand the principle and working procedure behind colorimetric techniques</li> </ol>
7.	19BCU112	Cell biology – Practical	<ol style="list-style-type: none"> <li>Identify the spotters of light microscopy</li> <li>Be able to visualize the cells</li> <li>Use the phase contrast microscopy at appropriate magnifications</li> <li>Identify the cells using staining techniques</li> <li>Interpret various stages of cell division</li> <li>Count the cells manually using hemocytometer</li> </ol>
8.	19BCU113	Chemistry Practical- I	<ol style="list-style-type: none"> <li>Perform preliminary tests for identification of an organic compound</li> <li>Perform and detect the elements present in the given compound</li> <li>Identify and differentiate between aromatic and aliphatic compound</li> <li>Identify different functional groups and its nature</li> <li>Perform confirmatory test for aldehydes, ketones, amines and amides</li> <li>Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds.</li> </ol>
9.	19LSU 201	Language – II	<ol style="list-style-type: none"> <li>இந்திய குடியரிமைப்பணி முதலானபோட்டித்தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய</li> </ol>

			<p>ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</p> <p>3. தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகு முறையிலான ஆய்வுச்சிந்தனைமேம்பாடு.</p> <p>4. வேலை வாய்ப்புக்குரிய சுயதிறன்மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</p> <p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப்பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழி பெயப்புத்துறை சார்ந்த வேலை வாய்ப்புத்திறன் பெற்றிருத்தல்.</p>
10.	19BCU201	Proteins	<ol style="list-style-type: none"> <li>1. Build on their understanding of proteins</li> <li>2. Use different molecular techniques used for separation of proteins</li> <li>3. Use different molecular techniques used for characterization of proteins</li> <li>4. Understand the three dimensional structure of proteins using computational tools</li> <li>5. Identify the biological significance of proteins</li> <li>6. Use appropriate technique during their project work</li> </ol>
11.	19BCU202	Enzymes	<ol style="list-style-type: none"> <li>1. Understand the basic concepts on enzymes</li> <li>2. Relate the initial velocity and substrate concentration of enzymes and be able to understand the kinetics of inhibition reactions</li> <li>3. Understand the basis of enzyme inhibitor drugs</li> <li>4. Be able to understand the regulation pattern of various enzymes</li> <li>5. Relate the regulation pattern of enzymes for its application in health and diseases</li> <li>6. Understand the application of enzymes as marker in various disease conditions</li> </ol>
12.	19BCU203	Chemistry-II	<ol style="list-style-type: none"> <li>1. The metallurgy of metals and the theories of coordination compounds and</li> <li>2. The industrial importance of EDTA, haemoglobin and chlorophyll.</li> <li>3. The concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.</li> <li>4. The preparation, classifications and properties of amino acids, proteins and carbohydrates.</li> <li>5. The concepts of first and second laws of thermodynamics</li> <li>6. The fundamentals of electrochemistry</li> </ol>
13.	19BCU211	Proteins – Practical	<ol style="list-style-type: none"> <li>1. Perform qualitative analysis of proteins</li> <li>2. Quantify the amount of protein in the given sample</li> <li>3. Determine isoelectric point of given protein</li> <li>4. Separate the protein using ammonium sulphate method</li> </ol>

			<ol style="list-style-type: none"> <li>5. Perform SDS-PAGE for separation of proteins</li> <li>6. Perform affinity chromatography</li> </ol>
14.	19BCU212	Enzymes- Practical	<ol style="list-style-type: none"> <li>1. Identify the source of enzymes and study the extraction and partial purification of enzymes</li> <li>2. Identify the optimum pH required for the maximum activity of a given enzyme</li> <li>3. Identify optimum substrate concentration required for the maximum activity of a given enzyme</li> <li>4. Identify the optimum temperature required for the maximum activity a given enzyme</li> <li>5. Analyse the inhibition pattern by various competitive inhibitors for the enzyme acid phosphatase purified from germinated mung bean</li> <li>6. Assay the activity of Lactate dehydrogenase and glucose – 6 – phosphate dehydrogenase enzymes</li> </ol>
15.	19BCU213	Chemistry Practical -II	<ol style="list-style-type: none"> <li>1. Estimate sodium carbonate and sodium hydroxide using standards</li> <li>2. Estimate sulphuric acid using standard oxalic acid</li> <li>3. Estimate potassium permanganate by alkalimetry method</li> <li>4. Estimate ferrous sulphate using stand Mohr's salt</li> <li>5. Estimate oxalic acid using standard ferrous sulphate</li> <li>6. Estimate calcium using direct method</li> </ol>
16.	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Understand the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
17.	18BCU301	Metabolism of Carbohydrates and Lipids	<ol style="list-style-type: none"> <li>1. Students are able to understand the breakdown of macromolecules like carbohydrate and lipids.</li> <li>2. Recognise the energy production pathways like glycolysis, glycogenolysis and TCA cycle.</li> <li>3. Interpret the central role of TCA cycle in energy metabolism.</li> <li>4. Relate the Calvin cycle with the synthesis of starch and sucrose and integration of carbohydrate metabolism in plant</li> <li>5. Understand the energy requirement and energy balance through glucose homeostasis</li> <li>6. Relate the interdependence of metabolic pathways</li> </ol>

18.	18BCU302	Metabolism of Amino acids and Nucleic acids	<ol style="list-style-type: none"> <li>1. Identify basic structures, names, and properties of nucleic acids</li> <li>2. Demonstrate overview of amino acid metabolism and catabolism of amino acids</li> <li>3. Understand the chemical logic of metabolic pathways</li> <li>4. Recognize and understand basic mechanisms of pathway regulation</li> <li>5. Understand the central dogma concept</li> <li>6. Understand the basis of amino acid and nucleic acid disorders</li> </ol>
19.	18BCU303	Chemistry-I	<ol style="list-style-type: none"> <li>1. Understand the molecular orbital theory, preparation and properties of inorganic compounds</li> <li>2. Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds.</li> <li>3. Have knowledge about important industrial chemicals like silicones, fuel gases.</li> <li>4. Know the classes of fertilizers and their impact on environment.</li> <li>5. Understand the elements of photochemistry, chemical kinetics and chromatography.</li> <li>6. Understand about the dyes, chemotherapy and vitamins</li> </ol>
20.	18BCU311	Metabolism of Carbohydrates and Lipids – Practical	<ol style="list-style-type: none"> <li>1. Use different qualitative methods to estimate glucose</li> <li>2. Use different quantitative methods to estimate glucose</li> <li>3. Perform fermentation techniques</li> <li>4. Understand the quantitative analysis of enzymes involved in carbohydrate metabolism</li> <li>5. Isolate lipid from the given sample</li> <li>6. Estimate enzymes involved in lipid metabolism</li> </ol>
21.	18BCU312	Metabolism of Amino acids and Nucleic acids- Practical	<ol style="list-style-type: none"> <li>1. Assay clinically relevant transaminases</li> <li>2. Assess the levels of urea, uric acid and creatinine in urine sample using qualitative methods</li> <li>3. Assess the levels of urea, uric acid and creatinine in urine sample using quantitative methods</li> <li>4. Interpret the results on amino acids and nucleic acids in clinical cases</li> <li>5. Understand case studies related to amino acid disorders</li> <li>6. Understand case studies related to nucleic acid disorders</li> </ol>
22.	18BCU313	Chemistry Practical - I	<ol style="list-style-type: none"> <li>1. Perform preliminary tests for identification of an organic compound</li> <li>2. Perform and detect the elements present in the given compound</li> <li>3. Identify and differentiate between aromatic and aliphatic compound</li> <li>4. Identify different functional groups and its nature</li> <li>5. Perform confirmatory test for aldehydes, ketones, amines and amides</li> <li>6. Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds.</li> </ol>
23.	18BCU304A	Tools and Techniques in Biochemistry	<ol style="list-style-type: none"> <li>1. Maintain safety documents.</li> <li>2. Prepare SOPs</li> <li>3. Detect radioisotopes</li> <li>4. Interpret virtual lab experiments</li> </ol>

			<ol style="list-style-type: none"> <li>5. Use different methods of centrifugation (differential/density gradient)</li> <li>6. Determine pKa for biological buffers using Henderson-Hasselbach equation in a given situation</li> </ol>
24.	18BCU304B	Concepts in Genetics	<ol style="list-style-type: none"> <li>1. Understand the principles and concepts of genetics</li> <li>2. Understand the basis of genetic disorders</li> <li>3. Comprehend different types of mutations (inversions, deletions, duplications and translocations)</li> <li>4. Understand the structure-function relationship of a specific gene</li> <li>5. Use appropriate model systems to study hereditary concepts</li> <li>6. Perform pedigree analysis</li> </ol>
25.	18BCU314A	Tools and Techniques in Biochemistry – Practical	<ol style="list-style-type: none"> <li>1. Know the strength of laboratory acids and bases</li> <li>2. Prepare serial dilution of concentrated solutions</li> <li>3. Determine the molar extension coefficient</li> <li>4. Obtain UV spectrum for a given compound</li> <li>5. Quantify nucleic acids using spectrophotometer</li> <li>6. Assess the purity of nucleic acids</li> </ol>
26.	18BCU314B	Concepts in Genetics - Practical	<ol style="list-style-type: none"> <li>1. Execute sex determination.</li> <li>2. Understand induction methods of polyploidy.</li> <li>3. Use buccal epithelial cells for genetic assessments.</li> <li>4. Understand monohybrid crosses.</li> <li>5. Calculate allele and genotype frequencies.</li> <li>6. Understand bacterial transformation.</li> </ol>
27.	18BCU401	Gene Organization, Replication and Repair	<ol style="list-style-type: none"> <li>1. Understand the genome organization</li> <li>2. Understand the mechanism of replication DNA in prokaryotes</li> <li>3. Understand the mechanism of replication DNA in eukaryotes</li> <li>4. Understand the mechanism of transcription in both prokaryotes and eukaryotes</li> <li>5. Understand the basis of recombination and transposition of DNA</li> <li>6. Understand DNA damage, mutation and DNA repair process</li> </ol>
28.	18BCU402	Gene Expression and Regulation	<ol style="list-style-type: none"> <li>1. Understand the mechanism of action of drugs</li> <li>2. Understand the stages of RNA biosynthesis</li> <li>3. Understand the mechanism of action of broad spectrum and specific antibiotics</li> <li>4. Utilize the specialized system for protein degradation</li> <li>5. Gain knowledge on RNA interference in the treatment of HIV and Cancer</li> <li>6. Gain knowledge on DNA repair mechanisms.</li> </ol>
29.	18BCU403	Chemistry-II	<ol style="list-style-type: none"> <li>1. The metallurgy of metals and the theories of coordination compounds and</li> <li>2. The industrial importance of EDTA, hemoglobin and chlorophyll.</li> <li>3. The concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.</li> <li>4. The preparation, classifications and properties of amino acids, proteins and carbohydrates.</li> <li>5. The concepts of first and second laws of thermodynamics.</li> </ol>

			6. The fundamentals of electrochemistry
30.	18BCU411	Gene Organisation, Replication and Repair- Practical	<ol style="list-style-type: none"> <li>1. Isolate prokaryotic chromosomal DNA</li> <li>2. Isolate eukaryotic chromosomal DNA</li> <li>3. Determine the melting temperature for the given nucleotide sequence</li> <li>4. Know the concepts of hyper and hypo chromicity</li> <li>5. Determine the viscosity of DNA</li> <li>6. Verify Chargaffs rule (purine=pyrimidine)</li> </ol>
31.	18BCU412	Gene Expression and Regulation- Practical	<ol style="list-style-type: none"> <li>1. Estimate total nucleic acids from plant tissue</li> <li>2. Estimate total nucleic acids from animal tissue</li> <li>3. Isolate mRNA using affinity chromatography</li> <li>4. Synthesize cDNA</li> <li>5. Perform RT-PCR</li> <li>6. Test Lac Operon in E. coli cells</li> </ol>
32.	18BCU413	Chemistry Practical - II	<ol style="list-style-type: none"> <li>1. Estimate sodium carbonate and sodium hydroxide using standards</li> <li>2. Estimate sulphuric acid using standard oxalic acid</li> <li>3. Estimate potassium permanganate by alkalimetry method</li> <li>4. Estimate ferrous sulphate using stand Mohr's salt</li> <li>5. Estimate oxalic acid using standard ferrous sulphate</li> <li>6. Estimate calcium using direct method</li> </ol>
33.	18BCU404A	Bioinformatics	<ol style="list-style-type: none"> <li>1. Understand the basics of computer aided drug design</li> <li>2. Perform experiment pair wise and multiple sequence alignment and will analyze the secondary and tertiary structures of protein sequences</li> <li>3. Understand the data structure (databases) used in bioinformatics and interpret the information</li> <li>4. Perform search on protein and metabolic pathway databases</li> <li>5. Perform BLAST to identify the sequence of amino acids.</li> <li>6. Construct a phylogenetic tree using bioinformatics</li> </ol>
34.	18BCU404B	Protein Purification Techniques	<ol style="list-style-type: none"> <li>1. Understand the basic principles pertaining to protein purification</li> <li>2. Perform gel exclusion, affinity and ion exchange chromatography for protein purification</li> <li>3. Perform SDS PAGE and identify the molecular weight of the protein</li> <li>4. Understand the principle, instrumentation and applications of HPLC</li> <li>5. Perform dialysis technique</li> <li>6. Identify and apply appropriate techniques for purification of the given protein sample</li> </ol>
35.	18BCU414A	Bioinformatics – Practical	<ol style="list-style-type: none"> <li>1. Be able to retrieve a sequence from NCBI database</li> <li>2. Be able to search a protein from PDB</li> <li>3. Understand the different molecular file formats for saving a protein/DNA sequence</li> <li>4. Apply different sequence alignment databases such as BLAST and CLUSTALW.</li> <li>5. Apply the statistical approaches and models for phylogenetic analysis and tree reconstruction.</li> <li>6. Analyze and predict the protein structure using structure prediction databases</li> </ol>

36.	18BCU414B	Protein Purification Techniques – Practical	<ol style="list-style-type: none"> <li>1. Gain knowledge on the basic principles pertaining to protein purification</li> <li>2. Perform gel exclusion, affinity and ion exchange chromatography for protein purification</li> <li>3. Perform SDS PAGE and identify the molecular weight of the protein</li> <li>4. Understand the principle, instrumentation and applications of HPLC</li> <li>5. Perform dialysis techniques for protein separation</li> <li>6. Identify and apply appropriate techniques for purification of the given protein sample</li> </ol>
37.	17BCU501A	Clinical Biochemistry	<ol style="list-style-type: none"> <li>1. Know about organization of clinical laboratory</li> <li>2. Specimen collection</li> <li>3. Precision, accuracy calculations</li> <li>4. Quality control</li> <li>5. Automated systems</li> <li>6. Know to use the diagnosis to assess organ functioning</li> </ol>
38.	17BCU501B	Biochemical Correlation of Diseases	<ol style="list-style-type: none"> <li>1. Inborn errors of metabolism</li> <li>2. Nutritional disorders</li> <li>3. Life style disorders</li> <li>4. Autoimmune diseases</li> <li>5. Contagious diseases</li> <li>6. Vaccine strategies</li> </ol>
39.	17BCU502A	Basic Microbiology	<ol style="list-style-type: none"> <li>1. Origin of microbiology field and theories</li> <li>2. Diverse nature of microbial organisms</li> <li>3. Life cycle of viruses</li> <li>4. Life cycle of bacteria</li> <li>5. Life cycle of algae, fungi and protozoa</li> <li>6. Emerging microbial threats</li> </ol>
40.	17BCU502B	Nutritional Biochemistry	<ol style="list-style-type: none"> <li>1. Concepts of nutrition</li> <li>2. Calorific value of carbohydrates, fats and proteins</li> <li>3. Recommended dietary allowances</li> <li>4. Nutrition as a strategy to prevent diseases</li> <li>5. Nutrition deficiency disorders</li> <li>6. Food drug interactions</li> </ol>
41.	17BCU503A	Plant Biochemistry	<ol style="list-style-type: none"> <li>1. Concepts of nutrition</li> <li>2. Calorific value of carbohydrates, fats and proteins</li> <li>3. Recommended dietary allowances</li> <li>4. Nutrition as a strategy to prevent diseases</li> <li>5. Nutrition deficiency disorders</li> <li>6. Food drug interactions</li> </ol>
42.	17BCU503B	Molecular Basis of Infectious Disease	<ol style="list-style-type: none"> <li>1. Concept of infection</li> <li>2. Variety of infectious pathogens</li> <li>3. The process of infection by pathogenic bacteria</li> <li>4. The process of infection by pathogenic viruses</li> <li>5. The process of infection by pathogenic parasites</li> <li>6. How to prevent/treat infections</li> </ol>
43.	17BCU504	Chemistry-I	<ol style="list-style-type: none"> <li>1. Understand the molecular orbital theory, preparation and properties of inorganic compounds</li> <li>2. Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds</li> <li>3. Have knowledge about important industrial chemicals like silicones, fuel gases</li> <li>4. Know the classes of fertilizers and their impact on environment</li> </ol>

			<ol style="list-style-type: none"> <li>Understand the elements of photochemistry, chemical kinetics and chromatography.</li> <li>Understand about the dyes, chemotherapy and vitamins</li> </ol>
44.	17BCU511A	Clinical Biochemistry- Practical	<ol style="list-style-type: none"> <li>How to collect and process serum/plasma samples?</li> <li>How to collect and process urine samples?</li> <li>Assessment of liver function</li> <li>Assessment of renal function</li> <li>Assessment of cardiac function</li> <li>Principles behind Dipstick method for fast diagnosis</li> </ol>
45.	17BCU511B	Biochemical Correlation of Diseases- Practical	<ol style="list-style-type: none"> <li>The execution of glucose challenge and tolerance test</li> <li>Measurement of cholesterol</li> <li>Basis of cell counting using hemocytometer</li> <li>Principles behind automated cell counters</li> <li>Assessment of bone mineral density</li> <li>Measurement of thyroid hormones using ELISA</li> </ol>
46.	17BCU512A	Basic Microbiology- Practical	<ol style="list-style-type: none"> <li>Sterilization methods</li> <li>Autoclave, filtration techniques</li> <li>Preparation of microbial culture media</li> <li>Assessment of bacterial strains</li> <li>Pure cultures using streaking methods</li> <li>Colony counting</li> </ol>
47.	17BCU512B	Nutritional Biochemistry- Practical	<ol style="list-style-type: none"> <li>Estimation of vitamin</li> <li>Homocysteine measurements</li> <li>Assessment of protein energy malnutrition</li> <li>Obesity assessments</li> <li>Oxidative stress measurements</li> <li>BMD assessments</li> </ol>
48.	17BCU513A	Plant Biochemistry— Practical	<ol style="list-style-type: none"> <li>Preparation of plant tissue lysates</li> <li>Estimation of enzymes during germination</li> <li>Extraction of enzymes from plant source</li> <li>Separation of plant metabolites using TLC</li> <li>PTC media preparation, culturing techniques</li> <li>Vitamin assessments</li> </ol>
49.	17BCU513B	Molecular Basis of Infectious disease-Practical	<ol style="list-style-type: none"> <li>Preparation of slides for infectious pathogens</li> <li>the principle behind WIDAL test</li> <li>the basis of Gram staining</li> <li>the detection of pathogens using PCR</li> <li>Dot Blot principles</li> <li>differential diagnosis</li> </ol>
50.	17BCU514	Chemistry Practical- I	<ol style="list-style-type: none"> <li>Perform preliminary tests for identification of an organic compound</li> <li>Perform and detect the elements present in the given compound</li> <li>Identify and differentiate between aromatic and aliphatic compound</li> <li>Identify different functional groups and its nature</li> <li>Perform confirmatory test for aldehydes, ketones, amines and amides</li> <li>Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds</li> </ol>
51.	17BCU601A	Genetic Engineering and Biotechnology	<ol style="list-style-type: none"> <li>The principles behind recombinant DNA technology</li> <li>Various tools required for recombinant DNA technology</li> <li>Cloning and expression vectors</li> <li>Production of industrial relevant proteins</li> </ol>

			<ol style="list-style-type: none"> <li>5. Production of drugs for clinical applications like insulin</li> <li>6. Application of rDNA technology in crop improvement</li> </ol>
52.	17BCU601B	Research Methodology	<ol style="list-style-type: none"> <li>1. Literature search tools such as PubMed, Scopus, Google scholar</li> <li>2. Usage of research tools (Data export, management of citation styles)</li> <li>3. Processing of data and statistical analysis</li> <li>4. Template for research draft preparation (Structure of an article)</li> <li>5. Communication of research outputs (Usage of MS-PPT and verbal skills)</li> <li>6. Fundamentals of plagiarism and IPR</li> </ol>
53.	17BCU602A	Drug Biochemistry	<ol style="list-style-type: none"> <li>1. Definition and classification of drugs</li> <li>2. Basics of Pharmacokinetics of a drug</li> <li>3. Basics of Pharmacodynamics in living system</li> <li>4. Mechanism of action of drugs</li> <li>5. Toxicity assessment</li> <li>6. Drug abuse</li> </ol>
54.	17BCU602B	Biostatistics	<ol style="list-style-type: none"> <li>1. Use appropriate representation styles to present the data</li> <li>2. Perform correlation analysis</li> <li>3. Perform regression analysis</li> <li>4. Calculate mean, median, mode and standard deviation.</li> <li>5. Calculate the relationship between two variables.</li> <li>6. Test the significance of a particular data by various parameters</li> </ol>
55.	17BCU603	Chemistry - II	<ol style="list-style-type: none"> <li>1. The metallurgy of metals and the theories of coordination compounds and</li> <li>2. The industrial importance of EDTA, haemoglobin and chlorophyll</li> <li>3. The concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds</li> <li>4. The preparation, classifications and properties of amino acids, proteins and carbohydrates</li> <li>5. The concepts of first and second laws of thermodynamics</li> <li>6. The fundamentals of electrochemistry</li> </ol>
56.	17BCU611A	Genetic Engineering and Biotechnology – Practical	<ol style="list-style-type: none"> <li>1. Know the precautions of handling Escherichia coli</li> <li>2. Isolate the plasmid DNA from Escherichia coli</li> <li>3. Restriction digestion using enzymes such as EcoRI, Hind III</li> <li>4. Amplify the rDNA using PCR</li> <li>5. Understand the techniques related to transformation of plasmid into E. coli</li> <li>6. Understand the steps involved in Western blot analysis</li> </ol>
57.	17BCU611B	Research Methodology – Practical	<ol style="list-style-type: none"> <li>1. Perform Literature survey related to life sciences/medical research</li> <li>2. Export the data to appropriate format</li> <li>3. Collate the data</li> <li>4. Identify the gap in the literature</li> <li>5. Inculcate originality in writing</li> <li>6. Understand IPR concepts</li> </ol>
58.	17BCU612A	Drug Biochemistry – Practical	<ol style="list-style-type: none"> <li>1. Handle small experimental animals such as rats, mice and rabbits</li> </ol>

			<ol style="list-style-type: none"> <li>2. Learn Enteral and parenteral route of drug administration</li> <li>3. Learn to assess behavioral changes</li> <li>4. Learn to assess drug toxicity</li> <li>5. Learn the basis of LD50</li> <li>6. Monitor adverse effects of drugs</li> </ol>
59.	17BCU612B	Biostatistics- Practical	<ol style="list-style-type: none"> <li>1. Measure mean, median and mode</li> <li>2. Perform Coefficient of variation</li> <li>3. Execute Correlation analysis</li> <li>4. Perform Regression analysis</li> <li>5. Perform RANK correlation test</li> <li>6. Analysis the difference between means using T-test</li> </ol>
60.	17BCU613	Chemistry Practical - II	<ol style="list-style-type: none"> <li>1. Estimate sodium carbonate and sodium hydroxide using standards</li> <li>2. Estimate sulphuric acid using standard oxalic acid</li> <li>3. Estimate potassium permanganate by alkalimetry method</li> <li>4. Estimate ferrous sulphate using stand Mohr's salt</li> <li>5. Estimate oxalic acid using standard ferrous sulphate</li> <li>6. Estimate calcium using direct method</li> </ol>

Name of the Department: **Biochemistry**

Course: M.Sc. Biochemistry

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BCP101	Chemistry of Biopolymers	<ol style="list-style-type: none"><li>1. Understand the structure and organization of storage and structural polysaccharides in living system</li><li>2. Recognize the structure and importance of proteins and amino acids in biological system.</li><li>3. Recall the role of lipids in bio membrane including signal transduction</li><li>4. Equip with the knowledge on antioxidants and their importance</li><li>5. Differentiate the structure, types, properties and functions of DNA and RNA</li><li>6. Recognize the nucleic acid interaction with proteins and gain knowledge in molecular techniques</li></ol>
2.	19BCP102	Enzymes and Microbial Technology	<ol style="list-style-type: none"><li>1. Understand the mechanism of action of enzymes and their classifications.</li><li>2. Recall the kinetics of enzyme catalyzed reactions</li><li>3. Understand the enzyme immobilization concept and apply the knowledge to produce more products out of it.</li><li>4. Gain knowledge in designing fermenter based on Industrial needs</li><li>5. Have clear understanding of microbe's implication to derive a product and the role of enzymes in downstream process.</li><li>6. Clear in concept of various culture techniques and apply the suitable one for a particular application.</li></ol>
3.	19BCP103	Bioinstrumentation and Good Laboratory Practices	<ol style="list-style-type: none"><li>1. Apply the centrifugation techniques in biological system</li><li>2. Use colorimetry and spectrophotometry for sample analysis</li><li>3. Use chromatographic techniques for sample analysis</li><li>4. Calibrate analytical instruments</li><li>5. Detect radioisotopes and analyze samples using electrophoretic techniques</li><li>6. Follow the good laboratory practices procedures</li></ol>
4.	19BCP104	Cellular Biochemistry	<ol style="list-style-type: none"><li>1. Recognize the organization and dynamics of mitochondria.</li><li>2. Recognize cell interaction and their mechanism.</li><li>3. Maintain cytoskeleton structure and functions of micro, macro and intermediary filaments.</li><li>4. Recognize the cell signaling mechanisms and pathways.</li><li>5. Enumerate the phases of cell cycle, events in cell division and mechanism of cell death</li><li>6. Relate properties of cancerous cells to mutational changes in gene function.</li></ol>
5.	19BCP105A	Plant Biochemistry	<ol style="list-style-type: none"><li>1. Recall the understanding of plant cell organelles and their functions</li></ol>

			<ol style="list-style-type: none"> <li>2. Recognize the source of food for other organisms and their synthesis in plants</li> <li>3. Recall the role of plant growth substances in various stages of plant growth</li> <li>4. Equip with tissue culture techniques</li> <li>5. Understand the role of secondary metabolites and their production and importance</li> </ol>
6.	19BCP105B	Ecology and Evolutionary biology	<ol style="list-style-type: none"> <li>1. Equip with gene transfer techniques</li> <li>1. Appreciate the diversity of life</li> <li>2. Interact with each other and their environment</li> <li>3. Have practical understanding of species interaction</li> <li>4. Built a structured community</li> <li>5. Expertise in behavioral ecology</li> <li>6. Recognize the central role of ecology and evolution in biology</li> </ol>
7.	19BCP105C	Biopharmaceutics	<ol style="list-style-type: none"> <li>1. Explain biopharmaceutical, physiological, biochemical and cell biology-related aspects</li> <li>2. Understand the transport and metabolism of drugs in the gastrointestinal tract and in the liver.</li> <li>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</li> <li>4. Have developed its ability to plan, compile, analyze and report experiment that has importance for biopharmaceutical issues -</li> <li>5. Recognize the regulatory requirements within the biopharmaceutical area</li> <li>6. Describe the role of biopharmaceutics in drug development within the pharmaceutical industry</li> </ol>
8.	19BCP111	Practical – I Quantitative Estimation and Separation Techniques	<ol style="list-style-type: none"> <li>1. Prepare buffers and reagents based on the needs of experiments</li> <li>2. Estimate macromolecules quantitatively thro colorimetric procedures</li> <li>3. Estimate vitamins and calcium using fluorimetry and titrimetry</li> <li>4. Quantify secondary metabolites using HPLC</li> <li>5. Separate the macro molecules using TLC and column chromatography</li> <li>6. Extract and purify protein from various sources</li> </ol>
9.	19BCP112	Practical – II Plant Biochemistry and Microbiology	<ol style="list-style-type: none"> <li>1. Phytochemical screening and secondary metabolite estimation</li> <li>2. Microbiological techniques</li> <li>3. Microbial identification in soil and water samples</li> <li>4. Isolation, characterization and purification of microbial enzymes.</li> <li>5. Antibacterial activity of active compounds</li> <li>6. Callus induction and regeneration of plantlets</li> </ol>
10.	19BCP201	Regulation of Metabolic Pathways	<ol style="list-style-type: none"> <li>1. Gain knowledge on glucose anabolic and catabolic pathways that ultimately control the glucose homeostasis.</li> <li>2. know the metabolic pathway of amino acid and their regulation with associated disorders.</li> <li>3. learn fatty acid synthesis and degradation and their regulation</li> </ol>

			<ol style="list-style-type: none"> <li>4. Able to explain the role of lipids, their metabolism and their stringent control by hormones and other factors.</li> <li>5. Understand the anabolic and catabolic processes associated with amino acids and nucleic acids and their regulation.</li> <li>6. Able to understand the energy homeostasis during starvation and energy excess</li> </ol>
11.	19BCP202	Molecular Biology	<ol style="list-style-type: none"> <li>1. Acquire the knowledge on molecular structure of genes.</li> <li>2. Understand the structure of nucleic acids and the DNA replication process</li> <li>3. Learn about the process of transcription</li> <li>4. Understand the mechanism of translation</li> <li>5. Learn about gene regulation in prokaryotes</li> <li>6. Learn about gene regulation in eukaryotes</li> </ol>
12.	19BCP203	Developmental Genetics	<ol style="list-style-type: none"> <li>1. Comprehensive, detailed understanding of the chemical basis of heredity</li> <li>2. Comprehensive and detailed understanding of genetic methodology</li> <li>3. Quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.</li> <li>4. Comprehensive detailed understanding of cellular mechanisms of developmental stages.</li> <li>5. Ramifications of inheritance, gene structure and function, gene mutation, and research related to genetics and its applications.</li> <li>6. Knowledge on chemical changes in cell division and cleavage</li> </ol>
13.	19BCP204	Bioinformatics	<ol style="list-style-type: none"> <li>1. Acquire the knowledge on biological data, submission and retrieval from databases.</li> <li>2. Able to make experiment pair wise and multiple sequence alignment</li> <li>3. Analyze the secondary and tertiary structures of protein sequences.</li> <li>4. Understand the data structure (databases) used in bioinformatics and interpret the information (especially: find genes; determine their functions),</li> <li>5. Understand and be aware of current research and problems relating to this area.</li> <li>6. Knowledge on applications of bioinformatics</li> </ol>
14.	19BCP205A	Recombinant DNA Technology	<ol style="list-style-type: none"> <li>1. Understand the application of genetic engineering techniques in basic and applied experimental biology</li> <li>2. Learn the concept of recombinant DNA technology or genetic engineering</li> <li>3. Understand the expression of gene cloning vectors</li> <li>4. Explore the knowledge on genomic library</li> <li>5. Proficiency in designing and conducting experiments involving genetic manipulation.</li> <li>6. Describe DNA fingerprinting, and restriction fragment length polymorphism (RFLP) analysis and their applications.</li> </ol>
15.	19BCP205B	Animal Tissue Culture	<ol style="list-style-type: none"> <li>1. Demonstrate foundational knowledge of Cell culture techniques and competence in laboratory techniques.</li> <li>2. Set up a tissue culture lab to carry out research based on cell lines.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Extrapolate the different types of culture media</li> <li>4. Understand the various types of cultures</li> <li>5. Learn synchronization of cell cultures and cell division</li> <li>6. Know the importance of stem cell research and its applications</li> </ol>
16.	19BCP205C	Genomics and Proteomics	<ol style="list-style-type: none"> <li>1. Identify and describe the different components in prokaryotic and eukaryotic genomes and proteomes.</li> <li>2. Identify molecular mechanisms responsible for diseases.</li> <li>3. Use the different methodologies, techniques and tools commonly used in genome sequencing, assembly and annotation.</li> <li>4. Use the different methodologies, techniques and tools commonly used in proteomics.</li> <li>5. Address the modern biological issues.</li> <li>6. Characterize the protein complexes</li> </ol>
17.	19BCP211	Practical – III Molecular Biology and Animal Biotechnology	<ol style="list-style-type: none"> <li>1. To demonstrate knowledge and understanding of the molecular machinery of living cells, cell and tissue culture to manipulate.</li> <li>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.</li> <li>3. Identification of DNA by Agarose gel electrophoresis</li> <li>4. Estimation of RNA by Orcinol method</li> <li>5. Preparation of competent E coli- transformation</li> <li>6. Ligation of DNA</li> </ol>
18.	19BCP212	Practical – IV Biological Databases and Analysis	<ol style="list-style-type: none"> <li>1. The course will enable students to use various biological databases</li> <li>2. The importance functions in the biological system.</li> <li>3. The use computational approaches for pair wise, multiple and phylogenetic analysis.</li> <li>4. Aware to predict the physio-chemical properties, protein structure and validation using computer-based labs.</li> <li>5. Solve the biological problems using various computational tools and techniques.</li> <li>6. Visualization of Protein structure by RASMOL.</li> </ol>
19.	18BCP301	Immunology	<ol style="list-style-type: none"> <li>1. The structure and functions of specialized immune cells</li> <li>2. Basis of humoral immunity</li> <li>3. Basis of cell mediated immunity</li> <li>4. Hypersensitivity reactions (I-V)</li> <li>5. Hereditary and acquired immunodeficiency diseases</li> <li>6. Utility of immune based principles in diagnostic field</li> </ol>
20.	18BCP302	Clinical Biochemistry	<ol style="list-style-type: none"> <li>1. Collect and analyze biological fluid</li> <li>2. Count the total RBC and different WBC using hemocytometer</li> <li>3. Learn the assessment of CRP, RA and ESR</li> <li>4. Perform estimation of clinically relevant enzymes</li> <li>5. Understand the cancer marker assessment</li> <li>6. Understand the endocrine pathophysiology</li> </ol>
21.	18BCP303	Endocrinology	<ol style="list-style-type: none"> <li>1. Hypothalamo - Hypophyseal axis</li> <li>2. Different classification of hormones</li> <li>3. Functioning of peptide and steroid hormones</li> </ol>

			<ol style="list-style-type: none"> <li>4. The molecular and cellular basis of endocrine pathologies</li> <li>5. Role of hormones in different stages of gestation</li> <li>6. The techniques involved in the assessment of endocrine functions</li> </ol>
22.	18BCP304	Drug Biochemistry	<ol style="list-style-type: none"> <li>1. What the body does to a drug</li> <li>2. What a drug does to a body</li> <li>3. Drug dependence</li> <li>4. The principles and procedure for genetically engineered drugs</li> <li>5. How the drugs elicit the desired effect</li> <li>6. Undesired effects of drugs</li> </ol>
23.	18BCP305A	Biostatistics and Research Methodology	<ol style="list-style-type: none"> <li>1. Use appropriate representation styles to present the data</li> <li>2. Perform correlation analysis</li> <li>3. Perform regression analysis</li> <li>4. Calculate mean, median, mode and standard deviation.</li> <li>5. Calculate the relationship between two variables.</li> <li>6. Test the significance of a particular data by various parameters.</li> </ol>
24.	18BCP305B	Clinical Research and IPR	<ol style="list-style-type: none"> <li>1. Steps involved in drug discovery</li> <li>2. Using small experimental animals</li> <li>3. Phase 2 and Phase 3 trials</li> <li>4. Questionnaire preparation</li> <li>5. Intellectual property rights</li> <li>6. Patents laws</li> </ol>
25.	18BCP305C	Dietetic Management of Disease	<ol style="list-style-type: none"> <li>1. Nutrition as a drug</li> <li>2. Dietary management of diabetes</li> <li>3. Dietary management of obesity</li> <li>4. Dietary management of cardiovascular diseases</li> <li>5. Nutrition deficiency affecting hematopoiesis and diet for individual with cancer</li> <li>6. Dietary management of musculoskeletal diseases</li> </ol>
26.	18BCP311	Practical – V Clinical Enzymes And Immunology	<ol style="list-style-type: none"> <li>1. Various methods of assaying clinically relevant enzymes</li> <li>2. The diagnostic significance of enzyme assays</li> <li>3. Working knowledge principle of Radial immunodiffusion</li> <li>4. Working knowledge principle of Double immunodiffusion</li> <li>5. Working knowledge principle of Immunoelectrophoresis</li> <li>6. Working knowledge principle of Glucose tolerance test</li> </ol>
27.	18BCP312	Practical – VI Clinical Biochemistry and Animal Studies	<ol style="list-style-type: none"> <li>1. Explain the physiopathological bases and the biochemical markers of the most prevalent diseases in our population</li> <li>2. Perform the estimation of biomolecules such as glucose and cholesterol</li> <li>3. Assess renal function through the analysis of urea and uric acid in serum</li> <li>4. Assess liver function through the estimation of bilirubin</li> <li>5. Determine A/G ratio and interpret its relevance</li> <li>6. Handle the small experimental animals</li> <li>7. Understand the differences and significance of routes of injections</li> </ol>

Name of the Department: **Biotechnology**

**Course:** B.Sc. Biotechnology

Sl. No	Course Code	Name of the Course	Course Outcomes
1.	19LSU101	Language -I	பாடத்திட்டப் பயன் விளைவு 1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல். 2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல். 3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு. 4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் . 5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. 6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்
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 roll 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

			<p>this knowledge in a variety of problem-solving situations.</p> <ol style="list-style-type: none"> <li>Apply their knowledge of cell biology to selected examples of changes or losses in cell function.</li> <li>Apply their knowledge of causal relationships between molecule/cell level phenomena (“modern” genetics) and organism-level patterns of heredity (“classical” genetics).</li> </ol>
5.	19BTU103	Chemistry -I	<p>The student understands</p> <ol style="list-style-type: none"> <li>The molecular orbital theory, preparation and properties of inorganic compounds.</li> <li>Theory of covalent bond, polar effects and stereochemistry of organic compounds.</li> <li>About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.</li> <li>Elements of photochemistry, chemical kinetics and chromatography.</li> <li>About the dyes, chemotherapy and vitamins.</li> <li>Principles and applications of Column, Paper and Thin Layer Chromatography.</li> </ol>
6.	19BTU111	Biochemistry and Metabolism Practical	<p>The learners will be able to,</p> <ol style="list-style-type: none"> <li>Gain skills on quantitative estimation methods for various biomolecules from natural sources.</li> <li>Acquire handling skills to handle the spectroscopy instrumentations.</li> <li>Obtain skills on primary screening of biochemical markers in samples.</li> <li>Develop skills to prepare useful reagents in the laboratory.</li> <li>Use of handling of glass wares, minor equipment for conducting experiments.</li> <li>Learn safety and precautionary measures for working in a laboratory.</li> </ol>
7.	19BTU112	Cell Biology Practical	<p>The learners will be able to,</p> <ol style="list-style-type: none"> <li>Understand the unique features of plant and animal cells.</li> <li>Gain the practical skills on tissue mounting techniques to visualize the cell morphology.</li> <li>Acquire knowledge about cell’s response to various environmental conditions.</li> <li>Able to differentiate the cells of various living organisms and get awareness of physiological processes of cell.</li> <li>Able to observe and correctly identify different cell types, cellular structures using different microscopic techniques.</li> <li>Able to handle the equipment available and identify the suitable and appropriate experiments for their experiments</li> </ol>
8.	19BTU113	Chemistry Practical - I	<p>The student understands</p> <ol style="list-style-type: none"> <li>The molecular orbital theory, preparation and properties of inorganic compounds.</li> <li>Theory of covalent bond, polar effects and stereochemistry of organic compounds.</li> </ol>

			<ol style="list-style-type: none"> <li>3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.</li> <li>4. Elements of photochemistry, chemical kinetics and chromatography.</li> <li>5. About the dyes, chemotherapy and vitamins.</li> <li>6. Principles and applications of Column, Paper and Thin Layer Chromatography.</li> </ol>
9.	19LSU201	Language - II	<p>பாடத்திட்டப் பயன் விளைவு</p> <ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
10.	19BTU201	Genetics	<p>The learners will be able to,</p> <ol style="list-style-type: none"> <li>1. Acquire knowledge about the central theories and methodologies traditional, molecular and population genetics.</li> <li>2. Acquire information on sex- linked inheritance and associated diseases.</li> <li>3. Understand the role of genetics in breeding and natural selection.</li> <li>4. Apply the principles of inheritance as formulated by Mendel.</li> <li>5. Apply the Hardy-Weinberg Law in analyzing population genetics for gene frequency, sex linkage, equilibrium, and heterozygote frequency.</li> <li>6. Acquire knowledge about the relationship between genetic, physical, and cytogenetic maps.</li> </ol>
11.	19BTU202	Chemistry - II	<ol style="list-style-type: none"> <li>1. The students will be able to understand the metallurgy of metals</li> <li>2. The students will be able to understand the theories of coordination compounds and the industrial importance of EDTA, haemoglobin and chlorophyll.</li> <li>3. The students will be able to understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.</li> <li>4. The students will be able to understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.</li> <li>5. The students will be able to understand the concepts of first and second laws of thermodynamics.</li> </ol>

			6. The students will be able to understand the fundamentals of electrochemistry.
12.	19BTU203	General Microbiology	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Gain rigorous knowledge on historical perspective of Microbiology</li> <li>2. Acquire basic knowledge on different structure of microbes.</li> <li>3. Get Ideas on different type of microscope.</li> <li>4. Acquire basic knowledge the different applications of microbiology in biotechnology.</li> <li>5. Acquire basic knowledge of genetic, metabolic strategies and ecology of microorganisms.</li> <li>6. Acquire basic knowledge about microbial metabolism, growth, energy generation and disease caused.</li> </ol>
13.	19BTU211	Genetics Practical	The learners will be able to <ol style="list-style-type: none"> <li>1. Gain rich knowledge on genetic model system used in research.</li> <li>2. Acquire basic knowledge on different stages in cell division.</li> <li>3. Get Ideas on pedigree analysis for detection of genetic disorders.</li> <li>4. Acquire basic knowledge on karyotyping</li> <li>5. Acquire basic knowledge of genetic variations among microorganisms.</li> <li>6. Apply the principles of inheritance as formulated by Mendel.</li> </ol>
14.	19BTU212	Chemistry Practical - II	<ol style="list-style-type: none"> <li>1. Student will be able to learn the principles of quantitative analysis of inorganic compounds.</li> <li>2. Student will be able to learn the estimation of sample present in a solution by volumetric analysis</li> <li>3. Understand the concepts of quantitative analysis</li> <li>4. Recognize the indicators, acid and bases used in volumetric analysis</li> <li>5. Estimate the amount of substance present in a given solution</li> <li>6. Utilize the mathematical skills doing calculations</li> </ol>
15.	19BTU213	General Microbiology Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Develop basic skill in aseptic techniques</li> <li>2. Have outline knowledge on isolation, sub culture and maintenance of microbes.</li> <li>3. Gain experience in microbiological laboratory practices and skills in the design and execution of microbiology related research.</li> <li>4. Develop skills to prepare useful medias for microbial growth in the laboratory.</li> <li>5. Use of handling of glass wares, minor equipment for conducting experiments.</li> <li>6. Learn safety and precautionary measures for working with microbes in a laboratory.</li> </ol>
16.	19AEC201	Environmental Studies	The learners will be able to, <ol style="list-style-type: none"> <li>1. Understand the concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>2. Study the concepts and methods from economic, political, and social analysis as they pertain to the design</li> </ol>

			<p>and evaluation of environmental policies and institutions.</p> <ol style="list-style-type: none"> <li>Learn the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.</li> <li>Creating the awareness about environmental problems among people.</li> </ol>
17.	18BTU301	Plant Physiology	<p>The learners will be able to,</p> <ol style="list-style-type: none"> <li>Gain adequate knowledge on plant biodiversity and importance.</li> <li>Understand the molecular mechanisms of macro and micro nutrients in plant growth.</li> <li>Get the basic and applied knowledge of plant physiology, growth, development and metabolism.</li> <li>Impart an insight into the various plant water relations</li> <li>Understand the mechanism of various metabolic processes in plants</li> <li>Equip students with skills and techniques related to plant physiology so that they can design their own experiments</li> </ol>
18.	18BTU302	Molecular Biology	<p>The learners will be able to,</p> <ol style="list-style-type: none"> <li>Achieve knowledge about the functions of nucleic acids and proteins.</li> <li>Acquire an in-depth knowledge of chemical and molecular processes that occur in and between the cells.</li> <li>Gain an insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.</li> <li>Acquire knowledge about the mechanisms behind gene regulations.</li> <li>Gain knowledge about mechanism behind translation and transcription</li> <li>Acquire an in-depth knowledge about mutation and its significance</li> </ol>
19.	18BTU303	Immunology	<p>The learners will be able to,</p> <ol style="list-style-type: none"> <li>Gain about the various cells and organs involved in the immune system.</li> <li>Understand the molecular mechanisms of antigen-antibody interactions and also the molecular mechanisms behind the immune response evoked after infection by various pathogens.</li> <li>Learn the theoretical basis for the various immunological techniques.</li> <li>Describe which cell types and organs present in the immune response</li> <li>Apply basic techniques for identifying antigen antibody interactions.</li> </ol>

			6. Illustrate various mechanisms that regulate immune responses and maintain tolerance
20.	18BTU304A	I.P.R., Entrepreneurship , Bioethics and Biosafety	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Acquire the knowledge on filling and submission of copy rights and related property rights.</li> <li>2. Gain knowledge in developing new pilot scale / large scale industries and associated formalities</li> <li>3. Understand the importance of patenting /copyrights/Trade marks</li> <li>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.</li> <li>5. Disseminate knowledge on patents, patent regime in India and abroad and registration aspects</li> <li>6. Disseminate knowledge on copyrights and its related rights and registration aspects</li> </ol>
21.	18BTU304B	Bio - Analytical Tool	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Know the working principle, maintenance, and calibrations of bioanalytical tools and technique</li> <li>2. Estimate the number of biomolecules using the Bioanalytical tool</li> <li>3. Implement the bioanalytical techniques to analyze the biomolecules</li> <li>4. Use selected analytical techniques.</li> <li>5. Be familiar with working principals, tools and techniques of analytical techniques.</li> <li>6. To understand the strengths, limitations and creative use of techniques for problem-solving.</li> </ol>
22.	18BTU311	Plant Physiology Practical	The learners will be able to <ol style="list-style-type: none"> <li>1. Study and impart knowledge about the occurrence, distribution, structure and life history of plants.</li> <li>2. Enable the students to learn in detail about mono and dicot plant activity.</li> <li>3. Learn the phylogeny concepts in plants.</li> <li>4. Understand water relation of plants with respect to various physiological processes.</li> <li>5. Explain root nodules from a leguminous plant</li> <li>6. Classify stress indicators</li> </ol>
23.	18BTU312	Molecular Biology Practical	The learners will be able to <ol style="list-style-type: none"> <li>1. Perform the experiments for isolation, purification and visualize the nucleic acid from various sources</li> <li>2. Acquire skills on plasmid DNA extraction.</li> <li>3. Gain basic knowledge on DNA extraction and separation by electrophoresis.</li> <li>4. Know the protocol for detection of mutation in microbes.</li> <li>5. Understand what genes are and how they are inherited</li> <li>6. Know how they control cellular activity and they respond to environment.</li> </ol>
24.	18BTU313	Immunology Practical	The learners will be able to, <ol style="list-style-type: none"> <li>1. Gain about the various cells and organs involved in the immune system.</li> <li>2. Understand the molecular mechanisms of antigen-antibody interactions and also the molecular</li> </ol>

			<p>mechanisms behind the immune response evoked after infection by various pathogens.</p> <ol style="list-style-type: none"> <li>Learn the theoretical basis for the various immunological techniques.</li> <li>Transfer knowledge of immunology into clinical decision-making through case studies presented in class.</li> <li>Demonstrate a capacity for problem-solving about immune responsiveness.</li> <li>Describe the roles of the immune system in both maintaining health and contributing to disease</li> </ol>
25.	18BTU314A	I.P.R., Entrepreneurship , Bioethics and Biosafety Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>Acquire the knowledge on filling and submission of copy rights and related property rights.</li> <li>Gain knowledge in developing new pilot scale / large scale industries and associated formalities</li> <li>Understand the importance of patenting /copyrights/Trade marks</li> <li>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.</li> <li>Disseminate knowledge on patents, patent regime in India and abroad and registration aspects</li> <li>Disseminate knowledge on copyrights and its related rights and registration aspects</li> </ol>
26.	18BTU314B	Bio - Analytical Tool Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>Know the working principle, maintenance, and calibrations of bioanalytical tools and technique</li> <li>Estimate the number of biomolecules using the Bioanalytical tool</li> <li>Implement the bioanalytical techniques to analyze the biomolecules</li> <li>Use selected analytical techniques.</li> <li>Be familiar with working principals, tools and techniques of analytical techniques.</li> <li>To understand the strengths, limitations and creative use of techniques for problem-solving</li> </ol>
27.	18BTU401	Bioprocess Technology	<p>The learners will be able to</p> <ol style="list-style-type: none"> <li>Gain overall knowledge of industrial biotechnology.</li> <li>Obtain information about the application of industrially important microbes.</li> <li>Know the screening, extraction and purification of enzymes.</li> <li>Designing of bioreactors and control necessary for maximizing production.</li> <li>Select and optimize media for maximum production of microbial metabolites.</li> <li>Designing of protocols for strain improvement and separation of molecules after fermentation process.</li> </ol>
28.	18BTU402	Recombinant DNA Technology	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>Outline the fundamental steps in a genetic engineering procedure.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Describe the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production.</li> <li>3. Explain the usefulness of plasmid preparations, how they are performed, and how the concentration and purity of plasmid samples can be determined.</li> <li>4. Discuss cloning strategies and techniques used to probe DNA for specific genes of interest.</li> <li>5. Conceptualize PCR technique in medical and forensic science.</li> <li>6. Summarize various applications of rDNA technology in human health care and safety regulations</li> </ol>
29.	18BTU403	Genomics and Proteomics	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Have a clear understanding on the application of genetic markers in genome mapping.</li> <li>2. Application of 2D technique to analyze the structure of protein.</li> <li>3. Analyze the genomic and proteomic data.</li> <li>4. Acquire knowledge and understanding of fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology.</li> <li>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</li> <li>6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.</li> </ol>
30.	18BTU404A	Industrial Fermentation	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Have a clear understanding on the application of growth kinetics.</li> <li>2. Design a fermenter and parameters to be monitored and controlled in fermentation process.</li> <li>3. Gain knowledge about the principle of sterilization necessary for fermentation.</li> <li>4. Acquire knowledge about the cell growth and product formation.</li> <li>5. Evaluate the kinetics and mechanism of microbial growth.</li> <li>6. Develop protocol for scale-up and harvesting from shake flask to bench top fermenter.</li> </ol>
31.	18BTU404B	Enzymology	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Understand the chemical principles of enzyme catalysis, including cofactor chemistry</li> <li>2. Show insight in the action of enzymes as biocatalysts and in factors that influence enzyme activity</li> <li>3. Understand the kinetics of enzymatic reactions</li> <li>4. Show awareness of the influence of enzyme structure on catalytic properties</li> <li>5. Show experience with purification, handling and characterization of proteins</li> <li>6. Show insight in the physico-chemical properties of proteins that underlie purification methods</li> </ol>

32.	18BTU411	Bioprocess Technology Practical	<p>The learners will be able to</p> <ol style="list-style-type: none"> <li>1. Gain overall knowledge of bioprocess technology.</li> <li>2. Obtain information about the application of industrially important microbes.</li> <li>3. Know the screening, extraction and purification of enzymes.</li> <li>4. Designing of bioreactors and control necessary for maximizing production.</li> <li>5. Select and optimize media for maximum production of microbial metabolites.</li> <li>6. Designing of protocols for strain improvement and separation of molecules after fermentation process</li> </ol>
33.	18BTU412	Recombinant DNA Technology Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Outline the fundamental steps in a recombinant DNA technique.</li> <li>2. Describe the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production.</li> <li>3. Explain the usefulness of plasmid preparations, how they are performed, and how the concentration and purity of plasmid samples can be determined.</li> <li>4. Discuss cloning strategies and techniques used to probe DNA for specific genes of interest.</li> <li>5. Conceptualize PCR technique in medical and forensic science.</li> <li>6. Utilize versatile tools and techniques employed in recombinant DNA technology.</li> </ol>
34.	18BTU413	Genomics and Proteomics Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Have a clear understanding on the application of genetic markers in genome mapping.</li> <li>2. Application of 2D technique to analyze the structure of protein.</li> <li>3. Analyze the genomic and proteomic data.</li> <li>4. Acquire knowledge and understanding of fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology.</li> <li>5. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.</li> <li>6. Utilize the various databases at NCBI and other sites for protein localization</li> </ol>
35.	18BTU414A	Industrial Fermentation Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Have a clear understanding on the application of growth kinetics</li> <li>2. Design a fermenter and parameters to be monitored and controlled in fermentation process.</li> <li>3. Gain knowledge about the principle of sterilization necessary for fermentation.</li> <li>4. Acquire knowledge about the cell growth and product formation.</li> <li>5. Evaluate the kinetics and mechanism of microbial growth.</li> <li>6. Develop protocol for scale-up and harvesting from shake flask to bench top fermenter.</li> </ol>

36.	18BTU414B	Enzymology Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Understand the chemical principles of enzyme catalysis, including cofactor chemistry</li> <li>2. Show insight in the action of enzymes as biocatalysts and in factors that influence enzyme activity</li> <li>3. Understand the kinetics of enzymatic reactions</li> <li>4. Show awareness of the influence of enzyme structure on catalytic properties</li> <li>5. Show experience with purification, handling and characterization of proteins</li> <li>6. Show insight in the physico-chemical properties of proteins that underlie purification methods</li> </ol>
37.	17BTU501A	Plant Diversity I	The learners will be able to, <ol style="list-style-type: none"> <li>1. Gain adequate knowledge on plant biodiversity and importance.</li> <li>2. Understand the molecular mechanisms of macro and micro nutrients in plant growth.</li> <li>3. Get the basic and applied knowledge of plant physiology, growth, development and metabolism.</li> <li>4. Discuss about importance of morphological structure, classification, reproduction and economic importance of Algae.</li> <li>5. Know the control measures of plant diseases.</li> <li>6. Explain about structure, classification, reproduction, life cycle and economic importance of Bryophytes.</li> </ol>
38.	17BTU501B	Basics of Forensic Science	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Demonstrate competency in the collection, processing, analyses, and evaluation of evidence.</li> <li>2. Demonstrate competency in the principles of crime scene investigation, including the recognition, collection, identification, preservation, and documentation of physical evidence.</li> <li>3. Demonstrate an understanding of the scientific method and the use of problem-solving within the field of forensic science.</li> <li>4. Identify the role of the forensic scientist and physical evidence within the criminal justice system.</li> <li>5. Demonstrate the ability to document and orally describe crime scenes, physical evidence, and scientific processes.</li> <li>6. Identify and examine current and emerging concepts and practices within the forensic science field.</li> </ol>
39.	17BTU502A	Bioinformatics	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Understand The relationship between sequence - structure - function of genes</li> <li>2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences</li> <li>3. Inculcate knowledge on building 3D structures of genes.</li> <li>4. Locate and use the main databases at the NCBI and EBI resources</li> <li>5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information</li> </ol>

			6. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences
40.	17BTU502B	Plant Diversity II	<p>The learners will be able to</p> <ol style="list-style-type: none"> <li>1. Study and impart knowledge about the occurrence, distribution, structure and life history of plants</li> <li>2. Learn in detail about vegetative and reproductive parts of plants.</li> <li>3. Learn the phylogeny and evolutionary concepts in plants.</li> <li>4. Learn how to handle a fossilized specimen</li> <li>5. Acquire knowledge about the structure, life history and Economic importance of Gymnosperms</li> <li>6. Learn the skills on morphological identification of plants.</li> </ol>
41.	17BTU503A	Plant Biotechnology	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Understand the growth conditions required to culture the plants in <i>invitro</i> conditions.</li> <li>2. Inculcate the deep understanding of Gene expression system of plants</li> <li>3. Acquire knowledge on producing Transgenic plants</li> <li>4. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of plant biotechnology experiments</li> <li>5. Learn the structure and organization of plant genome</li> <li>6. Learn the basic techniques for hybridization in producing transgenic plants.</li> </ol>
42.	17BTU503B	Evolutionary Biology	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Get hold of the knowledge on fundamentals of Evolutionary Biology.</li> <li>2. Expertise on the concepts of evolution, chromosomal aberrations; recombination and random assortment.</li> <li>3. Acknowledge on the Qualitative Studies Based on Field Observations</li> <li>4. To develop comprehensive knowledge regarding various Sources of Variations and their role in evolution.</li> <li>5. To explore salient features of various theories of evolution comprising of Lamarckism, Darwinism and Neo-Darwinism.</li> <li>6. To impart detailed understanding of Analogy, Homology, Paleontological Evidences, Embryological Evidences and Molecular Phylogeny.</li> </ol>
43.	17BTU504A	Animal Biotechnology	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Understand the growth conditions required to culture the animals in <i>invitro</i> conditions.</li> <li>2. Inculcate the deep understanding of Gene expression system of animal</li> <li>3. Acquire knowledge on producing Transgenic animal</li> <li>4. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of animal biotechnology experiments</li> <li>5. Learn the structure and organization of animal genome</li> </ol>

			6. Learn the basic techniques for hybridization in producing transgenic animal
44.	17BTU504B	Animal diversity-I	The learners will be able to <ol style="list-style-type: none"> <li>1. Outline the origin and classification of animal kingdom</li> <li>2. Describe the origin of animals and how they differ from other living organisms;</li> <li>3. Explain the relationship between animal diversity and evolutionary derived changes in animal body plans</li> <li>4. Analyze the various modes of adaptations in animals</li> <li>5. Identify and classify with examples the invertebrates</li> <li>6. Analyze the various modes of adaptations in animal.</li> </ol>
45.	17BTU511A	Plant Diversity I Practical	The learners will be able to, <ol style="list-style-type: none"> <li>1. Gain adequate knowledge on plant biodiversity and importance.</li> <li>2. Understand the molecular mechanisms of macro and micro nutrients in plant growth.</li> <li>3. Get the basic and applied knowledge of plant physiology, growth, development and metabolism.</li> <li>4. Discuss about importance of morphological structure, classification, reproduction and economic importance of Algae.</li> <li>5. Know the control measures of plant diseases.</li> <li>6. Explain about structure, classification, reproduction, life cycle and economic importance of Bryophytes.</li> </ol>
46.	17BTU511B	Basics of Forensic Science Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Apply the Laboratory skills to participate in the career needs of Forensic community.</li> <li>2. Become trained in the laboratory skills of different division of Forensic Science.</li> <li>3. Be able to work with different R&amp;D organizations.</li> <li>4. Identify the role of the forensic scientist and physical evidence within the criminal justice system.</li> <li>5. Demonstrate the ability to document and orally describe crime scenes, physical evidence, and scientific processes.</li> <li>6. Identify and examine current and emerging concepts and practices within the forensic science field.</li> </ol>
47.	17BTU512A	Bioinformatics Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Understand The relationship between sequence - structure - function of genes.</li> <li>2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences.</li> <li>3. Inculcate knowledge on building 3D structures of genes.</li> <li>4. Locate and use the main databases at the NCBI and EBI resources</li> <li>5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information.</li> <li>6. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences.</li> </ol>

48.	17BTU512B	Plant Diversity – II Practical	The learners will be able to <ol style="list-style-type: none"> <li>1. Study and impart practical knowledge about the occurrence, distribution, structure and life history of plants</li> <li>2. Learn in detail about vegetative and reproductive parts of plants.</li> <li>3. Learn the phylogeny and evolutionary concepts in plants.</li> <li>4. Learn how to handle a fossilized specimen</li> <li>5. Acquire knowledge about the structure, life history and Economic importance of Gymnosperms</li> <li>6. Learn the skills on morphological identification of plants</li> </ol>
49.	17BTU513A	Plant Biotechnology Practical	The learners will be able to <ol style="list-style-type: none"> <li>1. Study and impart knowledge about the occurrence, distribution, of plants and suitable explants.</li> <li>2. Learn in detail about growth hormones.</li> <li>3. Learn the sterilize and prepare an explant of plants.</li> <li>4. Learn how to handle a PTC equipment</li> <li>5. Acquire knowledge about aseptic condition maintained in lab</li> <li>6. Learn the skills on plant culture techniques</li> </ol>
50.	17BTU513B	Evolutionary Biology Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Get hold of the practical knowledge on fundamentals of Evolutionary Biology.</li> <li>2. Expertise on the Sampling techniques.</li> <li>3. Acknowledge on the Qualitative Studies Based on Field Observations</li> <li>4. To develop comprehensive knowledge regarding various Sources of Variations and their role in evolution.</li> <li>5. To explore salient features of various theories of evolution comprising of Lamarckism, Darwinism and Neo-Darwinism.</li> <li>6. To impart detailed understanding of Analogy, Homology, Paleontological Evidences, Embryological Evidences and Molecular Phylogeny.</li> </ol>
51.	17BTU514A	Animal Biotechnology Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Understand the growth conditions required to culture the animals in <i>invitro</i> conditions.</li> <li>2. Inculcate the deep understanding of Laboratory sterilization</li> <li>3. Acquire knowledge on DNA isolation from animal tissue</li> <li>4. Understand the Minimal Essential Growth medium</li> <li>5. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of animal biotechnology experiments</li> <li>6. Learn the structure and organization of animal genome</li> </ol>
52.	17BTU514B	Animal Diversity-I Practical	The learners will be able to <ol style="list-style-type: none"> <li>1. Outline the origin and classification of animal kingdom</li> <li>2. Describe the origin of animals and how they differ from other living organisms;</li> <li>3. Explain the relationship between animal diversity and evolutionary derived changes in animal body plans</li> </ol>

			<ol style="list-style-type: none"> <li>4. Analyze the various modes of adaptations in animals</li> <li>5. Identify and classify with examples the invertebrates</li> <li>6. Analyze the various modes of adaptations in animals.</li> </ol>
53.	17BTU601A	Molecular Diagnostics	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Get hold of the knowledge on fundamentals of molecular diagnostic techniques.</li> <li>2. Expertise on the concepts of infection, diagnosis and control assortment.</li> <li>3. Acknowledge on the qualitative studies based on biomarker observations.</li> <li>4. Apply methodologies of laboratory diagnostics to relevant states of health.</li> <li>5. Be aware of characteristics signs of clinical manifestations.</li> <li>6. Comprehend and analyse the concept of disease management.</li> </ol>
54.	17BTU601B	Biotechnology and Human Welfare	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Apply the biotechnology concept for environmental and social welfare.</li> <li>2. Expertise on the concepts of treatment strategies for waste to renewable energy.</li> <li>3. Able to produce by-products from waste with help of biotechnology techniques.</li> <li>4. Able to apply DNA based methods used in forensic science laboratory</li> <li>5. Able to entry into a wide range of biotechnology industries and research enterprises.</li> <li>6. Development of non-toxic therapeutic agents, recombinant live and DNA vaccines and gene therapy</li> </ol>
55.	17BTU602A	Medical Microbiology	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Apply the biotechnology concept for controlling infectious agents.</li> <li>2. Expertise on the concepts of metabolism, regulation and replication of pathogenic microbes.</li> <li>3. Able to get knowledge on the toxins released by microbes.</li> <li>4. Able to enter into a wide range of biotechnology industries with research enterprises.</li> <li>5. Develop of non-toxic therapeutic agents from microbes</li> <li>6. Able to get knowledge on Fungal and Protozoan infections</li> </ol>
56.	17BTU602B	Environmental Biotechnology	<p>On completion of the course, students are able to apply their knowledge on</p> <ol style="list-style-type: none"> <li>1. Bio-management of soil</li> <li>2. Bio-management of Petroleum Contaminants</li> <li>3. Environmental significance of genetically modified microbes, plants and animals</li> <li>4. Biosurfactants</li> <li>5. Treatment of municipal waste and Industrial effluents</li> <li>6. Genetic engineering of bacteria and their potential for bioremediation</li> </ol>
57.	17BTU603A	Biostatistics	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Apply the statistical tool knowledge for research data analysis.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Understand the concept of various hypothesis regarding data analysis.</li> <li>3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.)</li> <li>4. To perform analysis to determine the mean, median, mode and standard deviation of given sample/data</li> <li>5. To perform analysis, determine the probability of given sample/data</li> <li>6. To perform the t-test/F-Test and Chi-square test of given data</li> </ol>
58.	17BTU603B	Environment Management	<p>On completion of the course, students are able to apply their knowledge on</p> <ol style="list-style-type: none"> <li>1. Principles &amp; Concepts of Ecosystem</li> <li>2. Ecological efficiencies</li> <li>3. Environmental significance of Detection of Environmental pollutants</li> <li>4. Bio-geochemical cycles</li> <li>5. Hazardous wastes Environmental cleanup</li> <li>6. Genetic engineering of bacteria and their potential for bioremediation</li> </ol>
59.	17BTU611A	Molecular Diagnostics Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Get hold of the knowledge on fundamentals of molecular diagnostic techniques.</li> <li>2. Expertise on the concepts of infection, diagnosis and control assortment.</li> <li>3. Acknowledge on the qualitative studies based on biomarker observations.</li> <li>4. Apply methodologies of laboratory diagnostics to relevant states of health.</li> <li>5. Be aware of characteristics signs of clinical manifestations.</li> <li>6. Comprehend and analyses the concept of disease management</li> </ol>
60.	17BTU611B	Biotechnology and Human Welfare Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Apply the biotechnology concept for industry products.</li> <li>2. Expertise on the concepts of treatment strategy.</li> <li>3. Able to understand the plant part infected with a microbe.</li> <li>4. Able to enter into a wide range of research enterprises.</li> <li>5. Get expertise in Bioethics.</li> <li>6. Understand the concepts of complement course "Biotechnology in Human Welfare.</li> </ol>
61.	17BTU612A	Medical Microbiology Practical	<p>On completion of the course, students are able to</p> <ol style="list-style-type: none"> <li>1. Get hold of the knowledge on fundamentals of diagnostic techniques.</li> <li>2. Expertise on the concepts of infection, diagnosis and control assortment.</li> <li>3. Acknowledge on the qualitative studies based on biomarker observations.</li> <li>4. Apply methodologies of laboratory diagnostics to relevant states of health.</li> <li>5. Be aware of characteristics signs of clinical manifestations.</li> </ol>

			6. Comprehend and analyse the concept of disease management.
62.	17BTU612B	Environmental Biotechnology Practical	On completion of the course, students are able to apply their knowledge on <ol style="list-style-type: none"> <li>1. Environmental problems</li> <li>2. Wastewater treatment</li> <li>3. BOD and its calculation</li> <li>4. COD and its calculation</li> <li>5. Bacterial Examination of Water</li> <li>6. Biofertilizers</li> </ol>
63.	17BTU613A	Biostatistics Practical	On completion of the course, students are able to <ol style="list-style-type: none"> <li>1. Apply the statistical tool knowledge for research data analysis.</li> <li>2. Understand the concept of various hypothesis regarding data analysis.</li> <li>3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.)</li> <li>4. To perform analysis to determine the mean, median, mode and standard deviation of given sample/data</li> <li>5. To perform analysis, determine the probability of given sample/data</li> <li>6. To perform the t-test/F-Test and Chi-square test of given data</li> </ol>
64.	17BTU613B	Environment Management Practical	On completion of the course, students are able to apply their knowledge on <ol style="list-style-type: none"> <li>1. Ecosystem of soil</li> <li>2. GPS and related concepts</li> <li>3. Soil and their texture</li> <li>4. Population density</li> <li>5. Treatment of municipal waste and Industrial effluents</li> <li>6. Species variation and threatened species</li> </ol>
65.	17BTU691	DSE – 6 Project	On completion of the project, students are able to apply their knowledge on this dissertation Programme provides <ol style="list-style-type: none"> <li>1. Confidence in the basics and foundation of biotechnology concept and principles</li> <li>2. General competence and analytical skills on an advanced level of molecular techniques</li> <li>3. Accomplish the Need of industry, consultancy, and education and research fields.</li> <li>4. Development of skill-based research experience</li> <li>5. Hands on practice in the experiments</li> <li>6. Expertise in the selected project field</li> </ol>

Name of the Department: **Biotechnology**

**Course:** M.Sc. Biotechnology

Sl. No	Course Code	Name of the Course	Course Outcomes
1.	19BTP101	Fundamentals of Biochemistry and Microbiology	On completion of the course, students are able to <ol style="list-style-type: none"><li>1. Draw or describe the structure of amino acids, proteins, enzymes, chemical messengers, carbohydrates, lipids, and nucleic acid</li><li>2. Understand fundamental properties of elements, their role in formation of biomolecules and in chemical reactions within living organisms</li><li>3. Write the chemical reactions involved in biochemical pathways that produce ATP such as citric acid cycle and electron transport</li><li>4. Be familiar with the enzymes (biocatalysts), and their salient attributes including unique conformation and amazing catalytic properties</li><li>5. Describe the metabolic pathways in microorganisms</li><li>6. Designate the infectious organisms and treatment measures</li></ol>
2.	19BTP102	Cell Biology and Molecular Genetics	On successful completion of the course, students will be able to <ol style="list-style-type: none"><li>1. Describe the structures and basic components of eukaryotic cells</li><li>2. Illustrate how the cellular components are used for various cellular activities</li><li>3. Demonstrate the pathways involved in various cellular events including cell cycle</li><li>4. Understand the inheritance of genes among plants and animals and the genetic makeover as well as the physical appearance of organisms</li><li>5. Describe Mendelian inheritance and the inheritance of gene in human beings</li><li>6. Illustrate the effect of chromosomal abnormalities in human diseases</li></ol>
3.	19BTP103	Ecology, Evolutionary and Developmental Biology	On successful completion of the course, students should be able to <ol style="list-style-type: none"><li>1. Learn the fundamental principles and concepts of evolutionary theory and ecology</li><li>2. Use this knowledge to explore the evolution</li><li>3. Learn the basic ecological theory</li><li>4. Understand the principles and proposing solutions to the major environmental problems facing the biosphere</li><li>5. Describe evolutionary and ecological patterns and processes related to the survival</li><li>6. Describe relationships, distribution, abundance and interactions of organisms, their populations and environments</li></ol>
4.	19BTP104	Bioinstrumentation and Biostatistics	On successful completion of the course, students will be able to <ol style="list-style-type: none"><li>1. Demonstrate the bioinstrumentation principles with respect to device design and applications</li></ol>

			<ol style="list-style-type: none"> <li>2. Identify, explain and judge safety issues related to biomedical instrumentation</li> <li>3. Apply the principles of chromatography for the separation of bioactive compounds</li> <li>4. Recognize the definition of statistics and its relation with the other sciences</li> <li>5. Collect data relating to variable/variables which will be examined and calculate descriptive statistics from these data</li> <li>6. Apply the statistical knowledge in analyzing biological problems</li> </ol>
5.	19BTP105A	Biodiversity, Biosafety And IPR	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Interpret basics of biosafety and its impact on all the biological sciences and the quality of human life</li> <li>2. Recognize importance of biosafety practices and guidelines in research</li> <li>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</li> <li>4. Comprehend the importance of protection of new knowledge and innovations and its role in business</li> <li>5. Gain more insights into the regulatory affairs</li> <li>6. Describe various agreements and treaties related to the protection of intellectual property</li> </ol>
6.	19BTP105B	Nano-Biotechnology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Recognize the role of bio nanotechnology as an interdisciplinary tool and to understand how to use these new tools in solving biological problems</li> <li>2. Demonstrate the interactions and relationship between molecular dynamics, nanoscale physics and macroscopic system behaviour</li> <li>3. Explain biophysical mechanisms in the context of nanobiotechnology application areas</li> <li>4. Analyze and discuss the engineering requirements of multidisciplinary technology based on biology</li> <li>5. Explain the challenges of commercializing new technologies</li> <li>6. Demonstrate technical and cognitive skills associated with nanobiotechnology</li> </ol>
7.	19BTP105C	Bio-energy Technology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate bioenergy production processes adequate to diverse biomass characteristics</li> <li>2. Discuss state-of-the-art technologies of generating biofuels from sustainable bioresources</li> <li>3. Discuss and propose feasible biofuel technologies and biofuel products from selected biomasses</li> <li>4. To illustrate a bio-energy thermo-chemical conversion process</li> <li>5. Design biogas reactor capacity and propose optimal and economically viable technical operational condition</li> </ol>

			6. Demonstrate sequential bioethanol and biogas production and compare the scenarios with respect to energy recovery
8.	19BTP111	Fundamentals of Biochemistry and Microbiology - Practical – I	On successful completion of the course, students will be able to <ol style="list-style-type: none"> <li>1. Describe the quantification of sugars, amino acids and lipids</li> <li>2. Interpret the outcome of experiments that involve the use of biochemistry</li> <li>3. Perform separation of bioactive compounds using thin layer chromatography</li> <li>4. Demonstrate the effect of pH, temperature and substrate concentration in enzyme assays</li> <li>5. Carry out various microbiological staining techniques</li> <li>6. Join as a technician in biochemical and microbiological labs</li> </ol>
9.	19BTP112	Cell Biology and Molecular Genetics - Practical – II	On successful completion of the course, students will be able to <ol style="list-style-type: none"> <li>1. Interpret the outcome of experiments that involve the use of cell biology and molecular genetics techniques</li> <li>2. Discuss the various macromolecular components of cells and their functions</li> <li>3. Describe cell permeability in plants and animal cells</li> <li>4. Explain the basic steps involved in <i>Drosophila</i> giant chromosome preparation and nuclear staining</li> <li>5. Perform conjugation and transduction experiments</li> <li>6. Do cell cycle analysis experiments</li> </ol>
10.	19BTP201	Recombinant DNA technology	On successful completion of the course, students will be able to <ol style="list-style-type: none"> <li>1. Outline the fundamental steps in recombinant DNA technology</li> <li>2. Demonstrate the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production</li> <li>3. Explain the value of plasmid preparations and how the concentration and purity of plasmid samples can be determined</li> <li>4. Confer cloning strategies and techniques used in DNA probing for specific genes of interest</li> <li>5. Conceptualize PCR technique in clinical research</li> <li>6. Recapitulate various applications of recombinant DNA technology in human health care and safety regulations</li> </ol>
11.	19BTP202	Fermentation and Bioprocess Technology	On successful completion of the course, students will be able to <ol style="list-style-type: none"> <li>1. Evaluate factors that contribute in enhancement of cell and product formation during fermentation process</li> <li>2. Analyze kinetics of cell and product formation in batch, continuous and fed-batch cultures</li> <li>3. Differentiate the rheological changes during fermentation process</li> <li>4. Develop protocol for scale-up and harvesting from shake flask to bench top fermenter</li> </ol>

			<ol style="list-style-type: none"> <li>5. Analyze the bioprocess paradigms including scale-down, bioprocess simulation and economics in biological manufacturing</li> <li>6. Examine considerations in bioprocess simulation and economics, sterilization in bioproduct manufacturing</li> </ol>
12.	19BTP203	Enzyme Technology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate various enzyme process including delivery system for protein pharmaceuticals, structure function relationship in enzymes</li> <li>2. Describe the isolation and purification of industrially important enzymes</li> <li>3. Recognize how enzymatic pathways and regulatory networks function</li> <li>4. Appreciate the underlying mechanisms of Immobilized and soluble enzyme in health and industry</li> <li>5. Illustrate the role of artificial enzymes</li> <li>6. Apply the acquired knowledge of this course in enzymology research</li> </ol>
13.	19BTP204	Immunotechnology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>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</li> <li>2. Describe the organization of Ig genes, class switching in constant regions of genes and expression and regulation of Ig genes</li> <li>3. Recognize how antigens are processed, presented and immune activation occurs via B- and T- cells activation</li> <li>4. Appreciate the underlying mechanisms of auto-immune diseases and allergic reactions</li> <li>5. Illustrate the role of cancer immunotherapy</li> <li>6. Apply the knowledge of this course in research and pharmacological industries</li> </ol>
14.	19BTP205A	Pharmaceutical Biotechnology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Evaluate different pharmaceutical parameters of current biotechnology products</li> <li>2. Determine parameters related to stability and formulation of biotechnology products</li> <li>3. Discuss quality control procedures related to biotechnology products</li> <li>4. Demonstrate novel formulation methods for better delivery of biotechnology derived drugs</li> <li>5. Evaluate different techniques related to separation and purification of cell types; conduct techniques for measuring cell turnover and growth, conduct cytotoxicity assays</li> <li>6. Join pharmaceutical biotechnology lab and industries as a research assistant</li> </ol>
15.	19BTP205B	Agricultural Biotechnology	<p>On successful completion of the course, students will be able to</p>

			<ol style="list-style-type: none"> <li>1. Describe the genome organizations in plants</li> <li>2. Elaborate the plant cell and tissue culture systems</li> <li>3. Explain the genetic transformation techniques in plants</li> <li>4. Demonstrate genetic transformation in plants</li> <li>5. Explain the application of genetic transformation in plants</li> <li>6. Evaluate the importance of metabolic engineering and agricultural farming in plants</li> </ol>
16.	19BTP205C	Industrial Toxicology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Describe toxicology as a discipline in the overall health sciences framework</li> <li>2. Explain the basic concepts of chemical hazard and exposure as determinants of chemical toxicity</li> <li>3. Describe key pathways and mechanisms of chemical absorption, distribution, metabolism, storage and excretion in the human body</li> <li>4. Explain dose-response relationships as the basis of toxicity</li> <li>5. Outline the derivation of reference dose and other related measures of occupational exposure</li> <li>6. Describe the scientific basis of occupational exposure assessments and methods for their determination</li> </ol>
17.	19BTP211	Recombinant DNA, Fermentation and Bioprocess Technology - Practical – III	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Carry out DNA and RNA isolation from microbes, plants and animals</li> <li>2. Perform recombinant DNA techniques including restriction and digestion, ligation, transformation and PCR</li> <li>3. Explain the methods of wine production and alcohol determination</li> <li>4. Extract amylase enzyme from microbial sources</li> <li>5. Perform the enzyme immobilization assay</li> <li>6. Join in research and clinical labs as a project/ research assistant</li> </ol>
18.	19BTP212	Immuno- and Enzyme Technology - Practical – IV	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Carry out the immuno-laboratory techniques</li> <li>2. Explain the preparation of sample for analysis</li> <li>3. Describe the basic knowledge about antigen and antibody interaction using Rocket immune electrophoresis</li> <li>4. Perform various techniques like Immunoelectrophoresis, and ELISA etc.</li> <li>5. Perform the enzyme isolation and kinetics parameter calculations</li> <li>6. Join in research and clinical labs as a project/ research assistant</li> </ol>
19.	18BTP301	Plant and Animal Biotechnology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the growth conditions required to culture the plants and animal in <i>in vitro</i> conditions</li> </ol>

			<ol style="list-style-type: none"> <li>2. Inculcate the deep understanding of Gene expression system of plants</li> <li>3. Acquire knowledge on producing transgenic plants</li> <li>4. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of plant biotechnology experiments</li> <li>5. Learn the structure and organization of plant and animal genome</li> <li>6. Learn the basic techniques for hybridization in producing transgenic plants and animals</li> </ol>
20.	18BTP302	Genomics, Proteomics and Bioinformatics	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Have a clear understanding on the application of genetic markers in genome mapping</li> <li>2. Application of 2D technique to analyze the structure of protein</li> <li>3. Analyze the genomic and proteomic data</li> <li>4. Acquire knowledge and understanding of fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology</li> <li>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</li> <li>6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study</li> </ol>
21.	18BTP303	Food Biotechnology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented food products</li> <li>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</li> <li>3. Know the spoilage mechanisms in foods and thus identify methods to control deterioration and spoilage</li> <li>4. Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods</li> <li>5. Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries</li> <li>6. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation</li> </ol>
22.	18BTP304	Environmental Biotechnology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate various types of ecosystems, biodiversity components, environmental threats and policy</li> <li>2. Discuss the impact of environmental pollution and its remediation measures</li> </ol>

			<ol style="list-style-type: none"> <li>3. Recognize various global and regional environmental concerns due to natural causes and/or human activities</li> <li>4. Illustrate the role of Toxic chemicals in the environment and their associated health issues in humans</li> <li>5. Investigate some examples of different types of environmental pollution and their impacts</li> <li>6. Appreciate the scientific, ethical and/or social issues associated with certain applications of biotechnology for alleviating the environmental concerns</li> </ol>
23.	18BTP305 A	Applied Biotechnology	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of plant biotechnology experiments</li> <li>2. Appreciate the applications of animal cell culture in clinical and biotechnology industries</li> <li>3. Apply the knowledge of stem cell therapy to cure dreadful diseases</li> <li>4. Demonstrate the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented food products</li> <li>5. Appreciate the scientific, ethical and/or social issues associated with certain applications of biotechnology for alleviating the environmental concerns</li> <li>6. Join biotechnology labs and industries as a research assistant</li> </ol>
24.	18BTP305B	System Biology	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts of System Biology</li> <li>2. Differentiate various Metabolic Networks and Models in System Biology</li> <li>3. Understand the various databases available for data collection and interpretation</li> <li>4. Understand the scope and applications of tools</li> <li>5. Utilize the computational tools for applying biotechnology in research</li> <li>6. Study and deduce the molecular characterization of human genome</li> </ol>
25.	18BTP305C	Tissue Engineering and Regenerative Medicine	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Describe and use the fundamental tools and techniques used in tissue engineering</li> <li>2. Compare and contrast various strategies for repairing tissues</li> <li>3. Show mastery of fundamental topics in tissue engineering including stem cells, plasticity, trans differentiation and cloning</li> <li>4. Describe and the developments of biomaterials for regenerative therapies and tissue Engineering</li> <li>5. Discuss and give an example of how biomaterials are used to fabricate devices for clinical use</li> <li>6. Illustrate the basic concepts of cell culture and critical components of bioreactor/tissue design</li> </ol>

26.	18BTP311	Plant and Animal Biotechnology- Practical – V	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Acquaint with principles, technical requirement, scientific and commercial applications in plant and animal biotechnology</li> <li>2. Support methodologies in plant and animal tissue/cell culture</li> <li>3. Explain basic principles and techniques in genetic manipulation and genetic engineering</li> <li>4. Describe gene transfer technologies in plants and animals</li> <li>5. Designate problems associated with plant and animal cloning</li> <li>6. Join as lab manager and key scientist in plant and animal biotechnological research institutes and industries</li> </ol>
27.	18BTP312	Genomics, Proteomics and Bioinformatics - Practical – VI	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the relationship between sequence - structure - function of genes</li> <li>2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences</li> <li>3. Inculcate knowledge on building 3D structures of genes</li> <li>4. Locate and use the main databases at the NCBI and EBI resources</li> <li>5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information</li> <li>6. Use selected tools at RasMol, JMol and PyMol to run simple analyses on genomic sequences</li> </ol>
28.	18BTP491	Project and Viva Voce	<p>On completion of the course, students are able to apply their knowledge on</p> <ol style="list-style-type: none"> <li>1. This dissertation programme provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education and research.</li> <li>2. Students will acquaint core knowledge in the domain field of biotechnology.</li> <li>3. Intensive hands-on training in advanced techniques in molecular biology.</li> <li>4. Students will have adequate experience in doing PhD research.</li> <li>5. Students will be skilled analyst in operating instruments and experiments.</li> <li>6. Will get employment opportunity in research labs, pharmaceutical industries.</li> </ol>

Name of the Department: **Chemistry**

**Course:** B.Sc. Chemistry

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LSU101	Language –I	<ol style="list-style-type: none"><li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li><li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li><li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li><li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li><li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li></ol>
2.	19ENU101	English	<ol style="list-style-type: none"><li>1. Enable the learners to acquire English language skills at a faster pace.</li><li>2. Trained the learners to reflect on the literary works and communicate flexibly.</li><li>3. Knowledge about the Prose and Poetry</li><li>4. Development of the Short Story:</li><li>5. Learnt about Vocabulary, Grammar and Composition:</li><li>6. Knowledge about Proverb Expansion</li></ol>
3.	19CHU101	Mathematics I	<p>To give a strong basic foundation in mathematics, this is very much necessary to study any subject in chemistry.</p> <ol style="list-style-type: none"><li>1. Important tool for the study of physics and Chemistry.</li><li>2. Basic mathematical tools like vector analysis</li><li>3. Matrices</li><li>4. Complex variables and analysis etc.</li><li>5. Differential Calculus</li><li>6. Integral Calculus</li></ol>
4.	19CHU102	Inorganic Chemistry I: Atomic structure and Chemical Bonding	<ol style="list-style-type: none"><li>1. Explain the atomic theory of matter, composition of the atom, which defines the identity of a given element.</li><li>2. Understood the radial and angular part of orbitals.</li><li>3. Explain the relative sizes, masses, and charges of the proton, neutron, and electron, and their assembly to form different atoms.</li><li>4. Define the term isotope and their atomic and mass numbers.</li></ol>

			<ol style="list-style-type: none"> <li>5. Use the Periodic Table to rationalize similarities and differences of elements, including physical and chemical properties and reactivity.</li> <li>6. Predict common ionic charges of group 1A, 2A, 3A, 6A, and 7A elements based on position in the periodic table.</li> </ol>
5.	19CHU103	Organic Chemistry I: Basics and Hydrocarbons	<ol style="list-style-type: none"> <li>1. Describe molecular structure and bonding in organic molecules.</li> <li>2. Classify organic compounds by structure, use the IUPAC nomenclature, and identify conformational effects in organic compounds.</li> <li>3. Predict the products of reactions of alkenes and describe the mechanisms showing how the products are formed.</li> <li>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.</li> <li>5. Identify the types of isomerism in organic compounds, to identify and classify chiral centers, and explain the physical and chemical consequences of chirality.</li> <li>6. Correctly represent the structures and bonding of alkynes, and describe the mechanisms for reactions of alkynes and predict the products of such reactions.</li> <li>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.</li> <li>8. Identify conjugated pi systems and explain the effect of conjugation on molecular structure and reactivity; and predict the products of reactions of dienes.</li> <li>9. Describe mechanisms for substitution and elimination reactions, and predict the effect of nucleophile, leaving group, and solvent on the relative rates of S<sub>1</sub> versus S<sub>2</sub> reactions, and E<sub>1</sub> versus E<sub>2</sub> reactions, as well as on the relative rates of substitution versus elimination.</li> </ol>
6.	19CHU111	Mathematics I Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Solve complicated matrix related problems like matrix inverse and matrix multiplication.</li> <li>2. Acquire problem-solving skills through computer programming.</li> <li>3. Plot various functions and parametric curves.</li> <li>4. Worked the various differentiation equation</li> <li>5. Worked t the various integration equation</li> <li>6. Worked the mean, median, standard deviations.</li> </ol>
7.	19CHU112	Atomic structure and Chemical Bonding- Practical	<p>The Students are able</p> <ol style="list-style-type: none"> <li>1. Summarize the principles of volumetric analysis.</li> <li>2. Gained knowledge about the preparations of solutions</li> <li>3. Understood the preparation of appropriate concentrations, titrations</li> <li>4. Handled the respective apparatus while doing a titration.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Analyse the calculations involved in volumetric analysis and in the estimation of compounds using volumetric analysis.</li> <li>6. The lab will also provide hands-on opportunities to develop and apply this knowledge</li> </ol>
8.	19CHU113	Basics and Hydrocarbons- Practical	<p>The student will be able to</p> <ol style="list-style-type: none"> <li>1. Purify organic compounds by crystallisation.</li> <li>2. Characterisation of the compounds by elemental analysis, melting point, and effect of impurities on the melting point.</li> <li>3. Separation of organic compounds by paper chromatographic and TLC methods</li> <li>4. Preparation of organic compounds by standard organic reactions.</li> <li>5. The lab will also provide hands-on opportunities to develop and apply this knowledge.</li> <li>6. Understood the principles of chromatography and to separate organic compounds by paper and thin layer chromatography.</li> </ol>
9.	19LSU201	Language –II	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
10.	19CHU201	Mathematics II	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Appreciate the physical significance of Fourier series</li> <li>2. Understood the mathematical principles on transforms.</li> <li>3. Apply mathematical foundation to formulate and solve problems arising in physics</li> <li>4. Synthesize numerical techniques for practical problems</li> <li>5. Solving integration equation</li> <li>6. Solving Laplacian equation</li> </ol>
11.	19CHU202	Physical Chemistry II:	<ol style="list-style-type: none"> <li>1. Apply the basic concepts of calculus to concepts in chemistry.</li> </ol>

		Chemical Thermodynamics and its Application	<ol style="list-style-type: none"> <li>Describe the Three Laws of Thermodynamics and their development.</li> <li>Use the Maxwell equations and other thermodynamic relations to compute thermodynamic quantities from thermodynamic data tables.</li> <li>Derive the relationships between thermodynamic quantities; Interpret phase diagrams and explain phase equilibria in terms of chemical potentials.</li> <li>Recognize the forces which drive the chemical reactions in forward direction and the concept of the interchange of energy in a system.</li> <li>Explain the use of electrical energy for initiating chemical reactions and also how chemical reactions can be utilized to produce electrical energy, and the basic principle used in the formation of cells and batteries.</li> </ol>
12.	19CHU203	Organic Chemistry II: Oxygen Containing Functional Groups	<p>The students will able to</p> <ol style="list-style-type: none"> <li>Explain the chemistry of alkyl halides.</li> <li>Explain the chemistry of aryl halides.</li> <li>Contrast the preparation, properties and relative reactivity of alcohols and phenols</li> <li>Summarise Preparation, properties and standard reactions of carbonyl compounds</li> <li>Discuss the preparations, reactions and applications of epoxides, ethers and organometallic compounds</li> <li>List the preparations and properties of carboxylic acid and its derivatives.</li> </ol>
13.	19CHU211	Mathematics II - Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>Familiarize with the programming environment for numerical methods.</li> <li>Develop proficiency in skills to solve the algebraic equations.</li> <li>Evaluate the definite integrals using computer programming techniques</li> <li>Numerical Integration – Simpson's one third rule</li> <li>Numerical Integration – Simpson's three eighth rule</li> <li>Numerical Integration – Trapezoidal rule</li> </ol>
14.	19CHU212	Chemical Thermodynamics and its Application- Practical	<p>It enables the students calculate</p> <ol style="list-style-type: none"> <li>The heat capacity of a calorimeter</li> <li>The enthalpy of neutralisation,</li> <li>Calculated the ionisation of solution.</li> <li>Calculated the enthalpy of hydration of salt.</li> <li>The integral enthalpy of solution</li> <li>The basicity of a diprotic acid</li> </ol>
15.	19CHU213	Oxygen Containing Functional Groups- Practical	<p>The student knows to classify the</p> <ol style="list-style-type: none"> <li>Identification the organic functional groups like alcohols, phenols carbonyl and carboxylic acid groups</li> <li>Preparation organic compounds by acylation reactions</li> <li>Preparation organic compounds by benzylation reactions.</li> <li>Iodoform reactions and selective reductions.</li> <li>Preparations semi carbazone derivatives of ketones</li> </ol>

			6. Preparations S-Benzyl isothiuronium salt of aromatic acids.
16.	19AEC201	Environmental Studies	The students know about the explanation of 1. Fundamental terms and definitions of environment 2. Renewable and Non-renewable Resources. 3. Biodiversity and Its Conservation 4. Environmental Pollution 5. Gained knowledge about disaster management 6. Social Issues and the Environment
17.	19CHU301	Physics - I	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
18.	19CHU302	Inorganic Chemistry III: Coordination Chemistry	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.
19.	19CHU303	Physical Chemistry III: Phase Equilibria and Chemical Kinetics	The students have gained knowledge to summarize 1. The concept of Phase equilibria and phase diagrams 2. Understood the Clacius-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.
20.	19CHU304A	Pharmaceutical chemistry	The students have knowledge to create about the 1. Drug discovery 2. Utilization of the software using prediction of ADMET 3. Procedures to prepare analgesic, antipyretic, anti-inflammatory agents 4. Synthesis of Central Nervous System and cardiovascular drugs. 5. Fermentation process and preparation of antibiotics.

			6. Modified the preparation of antibiotics and related compounds
21.	19CHU304B	IT skills for chemists	<ol style="list-style-type: none"> <li>1. Interpret the Uncertainty in experimental techniques and Statistical treatment</li> <li>2. Under stood the knowledge of error analysis.</li> <li>3. Formulate a set of calculations that can address a relevant research question.</li> <li>4. Use one or several computer programs and extract useful information;</li> <li>5. Write a research paper that describes methods, results, and interpretation.</li> <li>6. Assess the meaning and validity of calculations that appear in the chemical literature.</li> </ol>
22.	19CHU311	Physics- I Practical	<p>Students can able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Knowledge about the physical Principles and applications of Electronics.</li> <li>4. Work efficiently in the Young modulus, rigidity modulus</li> <li>5. Refractive Index of a liquid prism-Spectrometer</li> <li>6. Thickness of a thin wire-Air wedge method</li> </ol>
23.	19CHU312	Coordination Chemistry - Practical	<p>The students have to</p> <ol style="list-style-type: none"> <li>1. Determine metals like Ni, Cu and Fe using the principle of gravimetric analysis</li> <li>2. Estimate the amount of nickel present in the NiDMG</li> <li>3. Prepare coordination complexes</li> <li>4. Measurement of <math>10^{-4}</math> Dq by spectrophotometric method</li> <li>5. Justify the properties of coordination complexes.</li> <li>6. Synthesis of ammine complexes of Ni(II) and its ligand exchange reactions (e.g. Bidentate ligands like acetylacetone, DMG, glycine) by substitution method.</li> </ol>
24.	19CHU313	Phase Equilibria and Chemical Kinetics- Practical	<p>The students able to determine,</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge in Phase equilibria</li> <li>2. Determination of critical solution temperature (CST) and</li> <li>3. Determination of eutectic temperature</li> <li>4. Determination distribution coefficients of two immiscible solutions.</li> <li>5. Apply their knowledge in Potentiometry to laboratory.</li> <li>6. Perform the titrations potentiometrically.</li> </ol>
25.	19CHU314A	Pharmaceutical Chemistry - Practical	<p>The students restate the</p> <ol style="list-style-type: none"> <li>1. Synthesis of pharmaceutical drugs like aspirin</li> <li>2. Synthesis of magnesium bisilicate.</li> <li>3. Determination of the melting point of aspirin</li> <li>4. Spectral characterization of aspirin</li> <li>5. Determine the melting point of antacid</li> <li>6. Spectral characterization of antacid</li> </ol>

26.	19CHU314B	IT skills for Chemists - Practical	<p>The students have to explained the</p> <ol style="list-style-type: none"> <li>1. The rules and the methods to be followed in the computer programming.</li> <li>2. the basic programme of curve fitting</li> <li>3. The numerical differentiation and integration.</li> <li>4. Interpretation of Statistical analysis of the numeric data.</li> <li>5. Draw the chemical structure using software</li> <li>6. Under stood the statistical significance testing.</li> </ol>
27.	19CHU401	Physics II	<p>The students have gained knowledge about</p> <ol style="list-style-type: none"> <li>1. Basic natural processes of Physics</li> <li>2. Gained about elasticity of solids.</li> <li>3. Learned about Einstein's photoelectric effect.</li> <li>4. Understood the basics of surface tension.</li> <li>5. Laser physics</li> <li>6. Gained knowledge about solar physics</li> </ol>
28.	19CHU402	Physical Chemistry IV: Electrochemistry	<p>The students have to restate</p> <ol style="list-style-type: none"> <li>1. The types of conductance measurements and the factors affecting it.</li> <li>2. The ionic mobilities and the applications of conductance measurements</li> <li>3. The order and molecularity of reactions and the integrated rate expressions for different types of first order reactions.</li> <li>4. Gained knowledge about chemical kinetics.</li> <li>5. The fundamentals of catalysis</li> <li>6. The fundamentals of photochemistry.</li> </ol>
29.	19CHU403	Organic Chemistry IV: Organic Spectroscopy	<p>The Student have gained knowledge about</p> <ol style="list-style-type: none"> <li>1. The principle and the theory behind the UV spectroscopy.</li> <li>2. The principle and the theory behind the IR spectroscopy.</li> <li>3. The principle and the theory behind the NMR spectroscopy.</li> <li>4. The occurrence, classification and their biological importance carbohydrates</li> <li>5. The classification of dyes</li> <li>6. Preparation, types, properties and uses of polymers.</li> </ol>
30.	19CHU404A	Green Methods in Chemistry	<ol style="list-style-type: none"> <li>1. Recognize the impact of green chemistry on human health and the environment.</li> <li>2. Knowledge about the special emphasis of an atom economy.</li> <li>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.</li> <li>4. Described the process involved in the real word cases like Surfactants for CO<sub>2</sub></li> <li>5. Synthetic azo pigments to replace toxic organic and inorganic pigments.</li> <li>6. Determination of environmentally safe marine antifoulant and plastic (poly lactic acid) made from corn.</li> </ol>

31.	19CHU404B	Analytical Clinical Biochemistry	The students have knowledge to categorize <ol style="list-style-type: none"> <li>1. The basic structure of carbohydrates.</li> <li>2. Classification and biological importance of Proteins.</li> <li>3. Classification and biological importance of lipids.</li> <li>4. Properties, functions and biochemical functions of steroid hormones</li> <li>5. Knowledge about enzyme, classification, mechanism and factors affecting enzyme activity.</li> <li>6. The biochemistry of diseases.</li> </ol>
32.	19CHU411	Physics II- Practical	<ol style="list-style-type: none"> <li>1. Field Intensity-Circular coil- Vibration magnetometer</li> <li>2. Co-efficient of thermal conductivity-Lee's disc method</li> <li>3. Refractive Index of a prism (I-I') curve-Spectrometer</li> <li>4. Moment of a magnet-Circular Coil-Deflection Magnetometer</li> <li>5. Temperature coefficient of resistance of a thermistor-Post office box</li> <li>6. Comparison of viscosities of two liquids</li> <li>7. Study of logic gates using IC's</li> <li>8. Study of NOR gate as Universal building block.</li> <li>9. Study of NAND gate as Universal building block.</li> <li>10. Verification of Basic logic gates using discrete components.</li> <li>11. Determination of Cauchy's constant – Spectrometer</li> <li>12. AC frequency – Sonometer</li> </ol>
33.	19CHU412	Physical Chemistry IV: Electrochemistry- Practical	The Student have interpreted to <ol style="list-style-type: none"> <li>1. Measured the conductance</li> <li>2. Determination of the cell constant</li> <li>3. Determination of conductometric titrations</li> <li>4. The kinetic aspects and rate measurements of different types of reactions.</li> <li>5. Determination the Acid hydrolysis of methyl acetate with hydrochloric acid.</li> <li>6. Determination of the Saponification of ethyl acetate</li> </ol>
34.	19CHU413	Organic Spectroscopy - Practical	The students have to categorize and demonstrate <ol style="list-style-type: none"> <li>1. About the Extraction of caffeine from tea leaves.</li> <li>2. The Preparation of urea formaldehyde resin</li> <li>3. The qualitative analysis of unknown organic compounds</li> <li>4. Identify simple organic compounds by IR spectroscopy</li> <li>5. Identify simple organic compounds by NMR spectroscopy</li> <li>6. The Preparation of methyl orange</li> </ol>
35.	19CHU414A	Green Methods in Chemistry - Practical	The students have to use <ol style="list-style-type: none"> <li>1. The basic principles and practical aspects like preparations and characterization in green approach.</li> <li>2. Preparation and characterization of biodiesel from vegetable oil.</li> <li>3. Characterization of biodiesel from vegetable oil.</li> <li>4. Preparation of phthalocyanine complex of Cu(II).</li> <li>5. Mechano-chemical solvent free synthesis of azomethine.</li> <li>6. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).</li> </ol>

36.	19CHU414B	Analytical Clinical Biochemistry- Practical	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
37.	19CHU501A	Cheminformatics	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
38.	19CHU501B	Chemistry of Cosmetics and perfumes	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
39.	19CHU502A	Polymer Chemistry	The students have listed the knowledge like 1. History of polymeric materials. 2. Criteria for polymeric material formation. 3. Learned Kinetics of polymerization. 4. Understood Characterisation of polymerisation. 5. Knowledge about Structure property relationships of polymer. 6. Properties of polymers.
40.	19CHU502B	Novel inorganic Solids	The student has identified 1. The synthesis and modification of inorganic solids 2. Understood about inorganic solids of technological importance 3. The synthesis and properties of nanomaterials 4. The synthesis of engineering materials used for mechanical construction 5. The synthesis and properties of composite materials 6. The synthesis and properties of speciality polymers
41.	19CHU503	Nitrogen containing functional groups, Heterocyclic Chemistry and Natural products	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.
42.	19CHU504	Inorganic Chemistry II: Metallurgy, s-	It enabled the students have discuss 1. The basic principles and methods involved in the metallurgy

		block and p-block Elements	<ol style="list-style-type: none"> <li>The basic properties of s-block elements and their compounds</li> <li>The complex formation tendency of s-block elements and their structure</li> <li>The basic properties of p-block elements and their compounds.</li> <li>Chemistry Hydrides, oxides and oxacids</li> <li>The preparation, properties, structure and uses of borazine, silicates, silicones, interhalogen compounds, phosphonitrilic and clathrates.</li> </ol>
43.	19CHU511A	Cheminformatics - Practical	<p>The students know to perform the cheminformatics aspects in the drug designing process.</p> <ol style="list-style-type: none"> <li>Applied the applications of cheminformatics in drug design.</li> <li>Draw the chemical structure using ChemDraw software.</li> <li>Molecular docking studies were carried using AutoDock software.</li> <li>Prediction ADME using swissadme software</li> <li>Learned Lipinski's rule of five using swiss ADME software.</li> <li>Prediction of drug likeness</li> </ol>
44.	19CHU511B	Chemistry of Cosmetics and Perfumes - Practical	<p>Students have knowledge to compose about the</p> <ol style="list-style-type: none"> <li>Preparation of talcum powder.</li> <li>Preparation of shampoo.</li> <li>Preparation of enamels.</li> <li>Preparation of hair remover.</li> <li>Preparation of face cream.</li> <li>Preparation of nail polish and nail polish remover.</li> </ol>
45.	19CHU512A	Polymer Chemistry- Practical	<p>The students will demonstrate and perform</p> <ol style="list-style-type: none"> <li>The preparation of different types of polymers by various methods</li> <li>The purification of polymers</li> <li>The characterization the polymers by chemical and instrumental methods.</li> <li>Preparation of isophthaloyl chloride</li> <li>Determination of hydroxyl number of a polymer using colorimetric method</li> <li>Analysis of the polymers</li> </ol>
46.	19CHU512B	Novel inorganic Solids- Practical	<p>The students have demonstrated</p> <ol style="list-style-type: none"> <li>The cation exchange method</li> <li>The ion exchange method</li> <li>coprecipitation methods of novel inorganic solids</li> <li>The method for the preparation of nanoparticles</li> <li>Nano particle preparation using green method</li> <li>Preparation of the hydrogel by coprecipitation method</li> </ol>
47.	19CHU513	Nitrogen containing functional groups, Heterocyclic Chemistry and Natural products – Practical	<p>The students will analyse the</p> <ol style="list-style-type: none"> <li>Functional group tests for nitrogen containing organic compounds</li> <li>Identification of nitro group</li> <li>Identification of amine group</li> <li>Identification of amide</li> <li>Tests used in the Identification of functional groups like alcohols, carboxylic acids</li> </ol>

			6. Identification of phenols, carbonyl compounds and esters
48.	19CHU514	Inorganic Chemistry II: Metallurgy, s-block and p-block Elements - Practical	The students will analyse <ol style="list-style-type: none"> <li>1. The iodometric titration methods.</li> <li>2. The complexometric titration methods</li> <li>3. The preparation the s and p-block metal complexes.</li> <li>4. Preparation of cuprous chloride</li> <li>5. Preparation of Manganese (III) phosphate</li> <li>6. Preparation of potash alum and chrome alum.</li> </ol>
49.	19CHU601A	Basic Analytical Chemistry	The course enables the students have to interpreted <ol style="list-style-type: none"> <li>1. The interdisciplinary nature of analytical chemistry</li> <li>2. The various methods involved in the analysis of soil ,</li> <li>3. Analysis water</li> <li>4. Analysis of food products</li> <li>5. Concepts of pH</li> <li>6. The various methods involved in the analysis of cosmetics</li> </ol>
50.	19CHU601B	Pesticide Chemistry	The students have designed <ol style="list-style-type: none"> <li>1. The synthesis and manufacture of many natural fertilizers</li> <li>2. The synthesis and manufacture of many synthetic fertilizers</li> <li>3. The synthesis and manufacture of organochlorines</li> <li>4. The synthesis and manufacture organophosphorus compounds</li> <li>5. The synthesis and manufacture of quinine pesticides</li> <li>6. The synthesis and manufacture of anilides</li> </ol>
51.	19CHU602	Inorganic Chemistry IV: Organometallic Chemistry	The student have discussed <ol style="list-style-type: none"> <li>1. The Theoretical Principles in Qualitative Analysis to identify the cations and anions</li> <li>2. The classification of organometallic compounds based on bond type</li> <li>3. Few important metal complexes of commercial importance</li> <li>4. About 18 electron rule</li> <li>5. The catalytic property of organometallic compounds.</li> <li>6. The Metal ions present in biological systems</li> </ol>
52.	19CHU603	Physical Chemistry I: States of Matter and Ionic Equilibrium	Students are able to <ol style="list-style-type: none"> <li>1. Explain the origin of <math>K_{eq}</math> 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.</li> <li>2. Apply the principles of electrochemistry to conductance, voltaic, and electrolytic systems.</li> <li>3. Provide a physical basis for Debye-Huckel theory.</li> <li>4. List the methods for arriving at a plausible mechanism and/or rate law based on kinetic information.</li> <li>5. Manipulate the gas laws to describe real and ideal gas behavior.</li> <li>6. Apply the steady-state hypothesis to obtain rate equations. Explain the basic principles of photochemical and radiation-chemical reactions.</li> </ol>
53.	19CHU604	Molecular modeling and drug design	The students are contrast <ol style="list-style-type: none"> <li>1. The introductory concepts of molecular modelling</li> </ol>

			<ol style="list-style-type: none"> <li>2. The force fields involved with different types of interactions</li> <li>3. About the Energy Minimization and Computer Simulation</li> <li>4. About the Molecular Dynamics &amp; Monte Carlo Simulation</li> <li>5. About the Structure Prediction and Drug Design</li> <li>6. QSAR studies</li> </ol>
54.	19CHU611A	Basic Analytical Chemistry- Practical	<p>The course enables the students have to interpreted</p> <ol style="list-style-type: none"> <li>1. Estimation of macro nutrients</li> <li>2. The various methods involved in the analysis of soil</li> <li>3. Analysis water</li> <li>4. Analysis of food products</li> <li>5. The various methods involved in the analysis of cosmetics</li> <li>6. Spectrophotometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drink</li> <li>7. Spectrophotometric determination of Iron in Vitamin</li> </ol>
55.	19CHU611B	Pesticide Chemistry- Practical	<p>The students have solved</p> <ol style="list-style-type: none"> <li>1. The calculation of acidity in given sample of pesticide formulation</li> <li>2. The calculation of alkalinity in given sample of pesticide formulation</li> <li>3. The synthesis of simple organophosphates</li> <li>4. The synthesis of phosphonates</li> <li>5. The synthesis of thiophosphates</li> <li>6. Analysis of organophosphates, phosphonates and thiophosphates</li> </ol>
56.	19CHU612	Organometallic Chemistry- Practical	<p>The students have</p> <ol style="list-style-type: none"> <li>1. Identified the anions and the cations in a mixture by Qualitative semi micro analysis</li> <li>2. Understood the chemistry of different reactions.</li> <li>3. Identified the interfering anion</li> <li>4. Define the principles behind the spot tests and</li> <li>5. Define the Principles of chromatographic separations</li> <li>6. Paper chromatographic separation of nickel and cobalt, copper and cadmium</li> </ol>
57.	19CHU613	Physical Chemistry I: States of Matter and Ionic Equilibrium- Practical	<p>The students develop the practical skill have categorized the</p> <ol style="list-style-type: none"> <li>1. Determination of surface tension of a liquid</li> <li>2. Determination the viscosity of a liquid</li> <li>3. Prepare a buffer solution and to measure the pH of a solution</li> <li>4. Monitor the pH of a solution during the course of a titration.</li> <li>5. The lab will also provide hands-on opportunities to develop and apply this knowledge</li> <li>6. Indexing of a given powder diffraction pattern of a cubic crystalline system.</li> </ol>
58.	19CHU614	Molecular modeling and drug design practical	<p>The students have analysed</p> <ol style="list-style-type: none"> <li>1. The Qualitative and qualitative calculations involved in the molecular modelling and its usefulness in drug design</li> <li>2. Comparison of the optimized C-C bond lengths in ethane, ethene, ethyne and benzene. Visualize the</li> </ol>

			<p>molecular orbitals of the ethane <math>\sigma</math> bonds and ethene, ethyne, benzene and pyridine <math>\pi</math> bonds.</p> <ol style="list-style-type: none"> <li>3. Performed a conformational analysis of butane.</li> <li>4. Determination of the enthalpy of isomerization of <i>cis</i> and <i>trans</i>-2-butene.</li> <li>5. Relate the charge on the hydrogen atom in hydrogen halides with their acid character.</li> <li>6. Comparison of the shapes of the molecules: 1-butanol, 2-butanol, 2-methyl-1-propanol, and 2-methyl-2-propanol.</li> <li>7. Compare the shapes of the molecules: 1-butanol, 2-butanol, 2-methyl-1-propanol, and 2-methyl-2-propanol.</li> </ol>
59.	19CHU691	Project work	<p>After study of course students have</p> <ol style="list-style-type: none"> <li>1. The firm foundations in the fundamentals and application of current chemical and scientific theories.</li> <li>2. Students are able to identify and solve chemical problems and explore new areas of research.</li> <li>3. Students are skilled in problem solving, critical thinking and analytical reasoning.</li> <li>4. students should have the ability to identify organic compounds by analysis and interpretation of spectral data.</li> <li>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.</li> <li>6. Students are skilled to perform the most commonly used NMR experiments and to interpret and document their results.</li> </ol>

Name of the Department: **Chemistry**

**Course:** M.Sc. Chemistry

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19CHP101	Organic Chemistry-I (Reaction Mechanism)	<ol style="list-style-type: none"><li>1. Learned the concept aromaticity and various types of aromaticity</li><li>2. Familiarized the various types of electrophilic and nucleophilic substitution reactions and their Mechanism</li><li>3. Learned the familiar addition and elimination reactions</li><li>4. Learned the concept of reaction intermediates.</li><li>5. Understood about the synthesis of aromatic compounds using electrophilic and nucleophilic substitution, addition and elimination reactions.</li><li>6. Described the various organic reaction mechanisms.</li></ol>
2.	19CHP102	Inorganic Chemistry-I (Nuclear Chemistry and Metallic Clusters)	<ol style="list-style-type: none"><li>1. Described the basic concepts of nuclear chemistry and types of nuclear reactions.</li><li>2. Discriminate the various defects and also known about its application on inorganic crystals</li><li>3. Understood the Basics of metallic clusters, preparation, properties and applications of metallic clusters</li><li>4. Learned the structure and bonding in molecules / ions and predict the structure of molecules / ions.</li><li>5. Described the type of defects in metals and about semi-conductors</li><li>6. Understood the inorganic and organometallic chemistry, catalysis in the molecular level</li></ol>
3.	19CHP103	Physical Chemistry-I (Quantum Chemistry and Group Theory)	<ol style="list-style-type: none"><li>1. The differences between classical and quantum mechanics. The limitations of classical mechanics.</li><li>2. The connection of quantum mechanical operators to observables</li><li>3. Probabilities, amplitudes, averages, expectation values, and observables</li><li>4. How molecular phenomena can be related to model problems</li><li>5. The fundamentals of group theory</li><li>6. The connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals, for example)</li><li>7. Identified the point groups of molecules and apply the concept of group theory to predict the spectroscopic properties.</li></ol>
4.	19CHP104	Organic and Inorganic Spectroscopy	<p>On completion of this course, students to have</p> <ol style="list-style-type: none"><li>1. Understood the basic concepts of Electronic and IR spectroscopy.</li><li>2. Understood the valuable concepts in NMR spectroscopy.</li><li>3. Learned the basic knowledge about Mass spectroscopy.</li></ol>

			<ol style="list-style-type: none"> <li>4. Applied the different aspects of NMR spectroscopy to predict the structure of compounds.</li> <li>5. Analyzed and identified simple organic molecules by using UV, IR, <math>^1\text{H-NMR}</math> and <math>^{13}\text{C-NMR}</math> and Mass spectral data.</li> <li>6. The students learned how to interpret the spectral data and to identify the structure of the molecules</li> </ol>
5.	19CHP105A	Elective-I Green Chemistry	<p>The student understood the following</p> <ol style="list-style-type: none"> <li>1. Designed of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.</li> <li>2. Created awareness for reducing waste, minimizing energy consumption in organic synthesis.</li> <li>3. Implemented techniques of green synthesis in organic reactions</li> <li>4. Used the various alternative resources for green technology in organic synthesis.</li> <li>5. Understood the various greener synthetic pathways and implement it in the production of pharmacological compounds.</li> <li>6. Applied the concept of microwaves and ionic liquids in various chemical reactions.</li> </ol>
6.	19CHP105B	Elective-I Medicinal Chemistry	<p>On the completion of the course, students to</p> <ol style="list-style-type: none"> <li>1. Understood the basics of Medicinal chemistry.</li> <li>2. Knew the drug targets, drug metabolism and about clinical training.</li> <li>3. Understood in-silico techniques involved in drug development.</li> <li>4. Discussed about membrane and receptors in drug delivery process.</li> <li>5. Applied the various theoretical laws to predict the pharmaco-kinetics of the compounds.</li> <li>6. Analyzing the molecular receptor binding and molecular recognition of the natural and synthetic compounds.</li> </ol>
7.	19CHP105C	Elective-I Molecular modelling and drug design	<p>On completion of this course, students have</p> <ol style="list-style-type: none"> <li>1. Gained the knowledge on the molecular modelling and field effects as a part of drug discovery.</li> <li>2. Understood on the various stages and various targets of drug discovery.</li> <li>3. Learned the importance of the pharmacophores in drug discovery.</li> <li>4. Studied the importance of the role of computer aided drug design in drug discovery.</li> <li>5. Practiced some online softwares to predict the physical and biological properties of natural/synthesized molecules.</li> <li>6. Applied the in-silico techniques to evaluate the drug-receptor binding affinities of the compounds.</li> </ol>
8.	19CHP111	Organic Chemistry-I (Qualitative analysis and single stage preparation)	<p>Students have to,</p> <ol style="list-style-type: none"> <li>1. Learned about the qualitative analysis by semi micro-qualitative analysis method.</li> <li>2. Learned the preparation of inorganic complexes.</li> <li>3. Described the basic concept and advantages of semi-micro qualitative analysis.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Understood the systematic separation d-block elements</li> <li>5. Studied the step wise procedure to predict the anions along with metals</li> <li>6. Identified the d-block elements with their special tests.</li> </ol>
9.	19CHP112	Organic Chemistry-II (Quantitative analysis and double stage preparation)	<p>On successful completion of the course the students should have</p> <ol style="list-style-type: none"> <li>1. Learned about the basic principles about quantitative analyses.</li> <li>2. Studied the concepts and systematic procedure in gravimetric analysis.</li> <li>3. Knew about the systematic procedure for estimation.</li> <li>4. Described the synthesis method for in-organic coordination complexes</li> <li>5. Known about separate the molecules and identify its nature through chromatography technique.</li> <li>6. Applied this ideas and concepts to water treatment process, food science and forensic fields.</li> </ol>
10.	19CHP201	Organic Chemistry-II (Rearrangements, Reactions, Photochemistry and Pericyclic reactions)	<p>On successful completion of the course the students should have</p> <ol style="list-style-type: none"> <li>1. Understood the versatile knowledge of rearrangements</li> <li>2. Understood the different organic reactions (radical and concerted).</li> <li>3. Learned about the principle of conformational analysis and stereochemistry.</li> <li>4. Explained about the molecular rearrangements, Pericyclic reactions and Cyclo-addition and sigmatropic reactions</li> <li>5. Described the basic ideas of pericyclic reactions.</li> <li>6. Designed new form of organic compounds using these basic concepts.</li> </ol>
11.	19CHP202	Inorganic Chemistry-II (Coordination Chemistry)	<p>On the completion of this course, students should have to</p> <ol style="list-style-type: none"> <li>1. Learned how to name coordination compounds and to be able to draw the structure based on its name</li> <li>2. Used Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds</li> <li>3. Described the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them</li> <li>4. Recognized the types of coordination compounds like metal carbonyls, carbocyclic pi complexes in coordination compounds</li> <li>5. Familiar with some reactions and applications of coordination compounds</li> <li>6. Predicted the geometric shapes of simple molecules</li> </ol>
12.	19CHP203	Physical Chemistry-II (Chemical Kinetics and Electro-chemistry)	<p>On the completion of this course, students have to</p> <ol style="list-style-type: none"> <li>1. Understood theories of reaction rates, how reaction rates are measured and represented in rate laws.</li> <li>2. Understood the applications of chemical kinetics in studying enzyme mechanisms</li> </ol>

			<ol style="list-style-type: none"> <li>3. Provided the knowledge of coulometric methods and applications.</li> <li>4. Evaluated the electrochemical principles involved in corrosion and energy storage.</li> <li>5. Remembered the basic polarography techniques.</li> <li>6. Understood the theories of catalysis and types of catalysis</li> </ol>
13.	19CHP204	Industrial Chemicals and Environment	<p>The course enables the students to</p> <ol style="list-style-type: none"> <li>1. Understood the industrial gases and inorganic chemicals which have an impact on the environment.</li> <li>2. Studied about the general principles of metallurgy.</li> <li>3. Learned the environment and its segments.</li> <li>4. Discussed about the water pollution and water treatment.</li> <li>5. Explained the application of bio-catalysis in energy saving techniques.</li> <li>6. Applying this technique to design energy saving devices with eco-friendly method.</li> </ol>
14.	19CHP205A	Elective-II Research Methodology for Chemistry	<p>On the completion of this course, students to</p> <ol style="list-style-type: none"> <li>1. Understood how to do literature survey about a particular scientific problem.</li> <li>2. Learned about the digital sources available for the literature collection.</li> <li>3. Studied the methods of doing scientific research and how to write scientific papers.</li> <li>4. Discussed about the chemical safety and ethical handling of chemicals.</li> <li>5. Understood about the data analysis.</li> <li>6. Knew about, how to handle the chemicals in safer way and how to analysis the data.</li> </ol>
15.	19CHP205B	Elective-II Analytical Chemistry	<p>On successful completion of the course the students should have to</p> <ol style="list-style-type: none"> <li>1. Learned about quantitative inorganic analysis.</li> <li>2. Understood the different colorimetric analysis.</li> <li>3. Learned the electrochemical methods of analysis.</li> <li>4. Understood the different chromatographic techniques.</li> <li>5. Learned about how to analyze the data obtained.</li> <li>6. Explained the various analytical techniques for inorganic compounds</li> </ol>
16.	19CHP205C	Elective-II Organometallic Chemistry	<p>On the completion of the course, Students to</p> <ol style="list-style-type: none"> <li>1. Learned about the Alkyls and Arene complexes</li> <li>2. Understood the bonding in olefin, acetylene and allyl systems</li> <li>3. Known about the concepts of synthesis, structure and bonding in metallocenes</li> <li>4. Understood the Organometallic reaction mechanisms and its applications</li> <li>5. Learned about the Catalysis, hydrogenation of olefins and oxoprocess</li> <li>6. Studied the concept of oxidation of olefins and polymerization.</li> </ol>
17.	19CHP211	Inorganic Chemistry Practical-I	<p>After completion of this course, Students have to</p> <ol style="list-style-type: none"> <li>1. Learned about the qualitative analysis by semi micro-qualitative analysis method.</li> </ol>

		(Qualitative Analysis and preparations)	<ol style="list-style-type: none"> <li>2. Learned the preparation of inorganic complexes.</li> <li>3. Described the basic concept and advantages of semi- micro qualitative analysis.</li> <li>4. Understood the systematic separation d-block elements</li> <li>5. Studied the step wise procedure to predict the anions along with metals</li> <li>6. Identified the d-block elements with their special tests.</li> </ol>
18.	19CHP212	Inorganic Chemistry Practical - II (Quantitative Analysis and Complex Preparations)	<p>On successful completion of the course the students should have</p> <ol style="list-style-type: none"> <li>1. Learned about the basic principles about quantitative analyses.</li> <li>2. Studied the concepts and systematic procedure in gravimetric analysis.</li> <li>3. Knew about the systematic procedure for estimation.</li> <li>4. Described the synthesis method for in-organic co-ordination complexes</li> <li>5. Known about separate the molecules and identify its nature through chromatography technique.</li> <li>6. Applied this ideas and concepts to water treatment process, food science and forensic fields.</li> </ol>
19.	19CHP301	Organic Chemistry – III (Natural Products)	<p>On the completion of this course, students should have to</p> <ol style="list-style-type: none"> <li>1. Understood the Importance of drinking water</li> <li>2. Learned the factors to produce water pollution</li> <li>3. Studied the parameters to be checked during water analysis.</li> <li>4. Create small water sewage treatment plant ideas and reuse the treated water</li> <li>5. Knew the various water treatment processes.</li> <li>6. Applying the concepts to control the water pollution in the environment.</li> </ol>
20.	19CHP302	Physical Chemistry - III (Thermodynamics)	<p>After completion of this course, students have to</p> <ol style="list-style-type: none"> <li>1. Understood about thermodynamics and Non-ideal systems</li> <li>2. Learned the third law of thermodynamics</li> <li>3. Studied the classical Maxwell-Boltzmann and quantum statistics</li> <li>4. Knew about partition functions and determining thermodynamic properties</li> <li>5. Understood heat capacity of solids.</li> <li>6. Applied the thermodynamic factors in various organic synthesis processes (how the reaction condition and reaction rate various depend on the thermodynamic factors).</li> </ol>
21.	19CHP303	Physical Methods in Chemistry (Instrumentation)	<p>Completion of this course, the students have to</p> <ol style="list-style-type: none"> <li>1. Understood different chromatographic methods.</li> <li>2. Discussed about electron spectroscopy and thermal analysis</li> <li>3. Learned Circular Dichroism and Optical Rotatory Dispersion</li> <li>4. Described the Electron Spin Resonance spectroscopy</li> <li>5. Knew about flame emission spectroscopy.</li> </ol>

			6. Applied the chromatographic and spectroscopic concepts for separation and identification of mixture compounds/complex/ metals.
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 dyeing 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.

		Conductometric Titration)	<ol style="list-style-type: none"> <li>3. Understood the various laws in electrochemistry.</li> <li>4. Applied the conductometric method for the solutions and measure its conductivity</li> <li>5. Knew about how to handle the conductivity meter, spectrophotometer.</li> <li>6. Applied the knowledge to realize the how distribution co-efficient influence the solubility of various systems.</li> </ol>
27.	19CHP312	Physical Chemistry Practical - II (Chemical Kinetics and Potentiometric Titrations)	<p>On the completion of this course, students to</p> <ol style="list-style-type: none"> <li>1. Learned about the principles of electrochemistry and determination EMF</li> <li>2. Understood about the basic needs of Chemical Kinetics and Potentiometric titrations.</li> <li>3. Studied the principles about adsorption process.</li> <li>4. Knew about how to handle the potentiometer, electrodes and spectrophotometers.</li> <li>5. Applying the knowledge of chemical kinetics in various preparation organic/inorganic compounds.</li> <li>6. Investigating the metal concentration in water samples using adsorption technique.</li> </ol>

Name of the Department: **Commerce**

**Course:** B.Com. CA

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LAU101	Language - I	<ol style="list-style-type: none"><li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li><li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li><li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li><li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li><li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li></ol>
2.	19ENU101	English – I	<ol style="list-style-type: none"><li>1. Develop the knowledge of interpersonal skills.</li><li>2. Establish and maintain social relationships.</li><li>3. Genres of literature will give moral values of life.</li><li>4. Develop communication skills in business environment</li><li>5. Communication skills will get developed.</li><li>6. Develop to have language competence.</li></ol>
3.	19CCU101	Financial Accounting	<ol style="list-style-type: none"><li>1. Comprehend the accounting concepts, principles and to comply the accounting standards.</li><li>2. Prepare the final accounts and compute inventory valuation.</li><li>3. Recognize the accounting process of financial statement and critically think in preparing accounts, rectification of errors, Consignment and Joint Venture.</li><li>4. Acquire knowledge on accounting for branches and also to ascertain the financial position of each branch separately.</li><li>5. To apply appropriate judgment derived from knowledge of accounting theory to prepare and validate the accuracy of financial statements.</li><li>6. Use information to support business processes and practices, such as problem analysis and decision making.</li></ol>

4.	19CCU102	Introduction to Information Technology	<ol style="list-style-type: none"> <li>1. Prepare documents and reports for the organization.</li> <li>2. Prepare datasheet and apply the built-in functions for analyzing the data to support decision making.</li> <li>3. Utilize visual aids and tools to present the data</li> <li>4. Design the presentations for the business meetings</li> <li>5. Store, retrieve data and make decisions based on the information.</li> <li>6. To improve the way in which we live, to make our lives easier by reducing paperwork.</li> </ol>
5.	19AEC101	Business Communication	<ol style="list-style-type: none"> <li>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</li> <li>2. Draft business correspondence for the organization requirement.</li> <li>3. Prepare business reports for organization needs.</li> <li>4. Use appropriate technology for business communication.</li> <li>5. Draft the resume and develop skills to face the interview.</li> <li>6. Expertise that the learner will get from a learning activity</li> </ol>
6.	19CCU111	Introduction to Information Technology (Practical)	<ol style="list-style-type: none"> <li>1. Prepare documents and reports for the organization.</li> <li>2. Prepare datasheet and apply the built-in functions for analyzing the data to support decision making.</li> <li>3. Utilize visual aids and tools to present the data</li> <li>4. Design the presentations for the business meetings</li> <li>5. Store, retrieve data and make decisions based on the information.</li> <li>6. Keep information safe and make it easier to provide service delivery.</li> </ol>
7.	19LAU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
8.	19ENU201	English – II	<ol style="list-style-type: none"> <li>1. Learn to enjoy the ecstasy of literature.</li> </ol>

			<ol style="list-style-type: none"> <li>2. The select literary pieces will develop the confidence level of the learners.</li> <li>3. To get the social values.</li> <li>4. To know the importance of communication</li> <li>5. Get sound knowledge in English</li> <li>6. Trained to communicate well for business purpose.</li> </ol>
9.	19CCU201	Business Law	<ol style="list-style-type: none"> <li>1. Identify the basic legal principles behind contractual agreements.</li> <li>2. Understand the relevance of business law in economic and social context.</li> <li>3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.</li> <li>4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.</li> <li>5. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.</li> <li>6. Basic and broad knowledge in business laws in management.</li> </ol>
10.	19CCU202	Business Mathematics and Statistics	<ol style="list-style-type: none"> <li>1. Utilize the concept of matrices, differential calculus to solve business problems</li> <li>2. Calculate and apply the measure of central tendency and dispersion in decision making.</li> <li>3. Evaluate the relationship and association between variables to formulate the strategy in business.</li> <li>4. Apply the concept of index numbers and trend analysis in business decisions.</li> <li>5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.</li> <li>6. Analyze problems in economics, business, and accounting to determine appropriate methods for solving them using business math concepts and applications.</li> </ol>
11.	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>

			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	<ol style="list-style-type: none"> <li>1. Students learnt the basics and purposes of listening skill.</li> <li>2. Students will know the importance of speaking.</li> <li>3. Students developed the speaking skills on telephone, business and also in travel</li> <li>4. Learnt some effective vocabulary learning strategies.</li> <li>5. Students will be able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.</li> <li>6. Students will have honed the skills of communication which is needed for business purpose.</li> </ol>
13.	19CCU301	Corporate Accounting	<ol style="list-style-type: none"> <li>1. Comprehend and apply the accounting process related corporate accounting</li> <li>2. Prepare final accounts for corporate entity.</li> <li>3. Understand the accounting standard and apply the same for corporate entity and amalgamation.</li> <li>4. Understand the difference of banking balance sheet and non-banking balance sheet</li> <li>5. Enhance the problem-solving skills, analytical skills and communication skills in the accounting context.</li> <li>6. Develop the knowledge of business and management principles.</li> </ol>
14.	19CCU302	Database Management System	<ol style="list-style-type: none"> <li>1. Design Databases for applications and apply learning in lifelong practice.</li> <li>2. Use the Relational model, ER diagrams.</li> <li>3. Apply concurrency control and recovery mechanisms for practical problems.</li> <li>4. Design the Query Processor and Transaction Processor.</li> <li>5. Apply security concepts to databases</li> <li>6. Critically formulate a query for analysing the data and communicate in oral and written form.</li> </ol>
15.	19CCU303A	Auditing and Corporate Governance	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of auditing, corporate governance and Corporate social responsibility (CSR)</li> <li>2. Recall the audit techniques, corporate governance and CSR practices.</li> <li>3. Apply lifelong the key learning of best auditing process, Corporate governance and CSR practices</li> <li>4. Communicate orally and in written form the auditing concept and techniques, Corporate governance and CSR concepts and practices in business.</li> <li>5. Familiar with the standards and laws pertaining to the auditing, Corporate Governance and CSR.</li> <li>6. Demonstrate an ability to write and debate about aspects of business ethics and corporate governance.</li> </ol>
16.	19CCU303B	Computerised Accounting System	<ol style="list-style-type: none"> <li>1. Comprehend on the knowledge of Tally, its features and its importance.</li> <li>2. Communicate orally and in written form the Features of Tally in capturing accounting procedures.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.</li> <li>4. Familiarize on the incorporation of GST standards into accounting and computerised accounting process.</li> <li>5. Practice of managements accounting and generate required reports for managerial decision making</li> <li>6. Understanding the significance and utilization of job arrange preparing and job costing.</li> </ol>
17.	19CCU311	Database Management System (Practical)	<ol style="list-style-type: none"> <li>1. Create Table DML command and perform logical operations using the Oracle as IT platform</li> <li>2. Design Query using Transaction command</li> <li>3. Develop programme using various operations</li> <li>4. Design query using character, date and joins function.</li> <li>5. To critically analyze the requirement and Write a PL/SQL Programme.</li> <li>6. Prepare the written report.</li> </ol>
18.	19CCU312A	Auditing and Corporate Governance (practical)	<ol style="list-style-type: none"> <li>1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.</li> <li>2. Classify and apply vouching, verification and valuation technique to appropriate situation</li> <li>3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.</li> <li>4. Communicate orally and in written form about the findings and solution.</li> <li>5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.</li> <li>6. Understand key of expertise such as Internal Audit, Compliance, and Information.</li> </ol>
19.	19CCU312B	Computerised Accounting System (practical)	<ol style="list-style-type: none"> <li>1. Familiarize on the accounts heads, vouching, inventory valuations, TDS and Pay roll process available in the accounting software</li> <li>2. Classify the items under items heads.</li> <li>3. Generate the financial Reports, TDS and pay roll reports and evaluate the output.</li> <li>4. Communicate the outputs in written form identifying the objective and outcome of each exercise.</li> <li>5. To apply the utilization of computerised system as a lifelong learning.</li> <li>6. Enables the auditor to perform an audit or track changes that affect the integrity of a transaction.</li> </ol>
20.	19ENU401	English – IV	<ol style="list-style-type: none"> <li>1. Students have acquired proficiency in communication.</li> <li>2. Students have become adept in written communication and presentation skills.</li> <li>3. Practice the skill of writing in English and that of public speaking.</li> <li>4. Establish and maintain social relationships.</li> <li>5. Develop communication skills in business environment.</li> <li>6. Refine communication competency through LSRW skills.</li> </ol>
21.	19CCU401	Research Methodology	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research</li> </ol>

			<p>design, sampling techniques, hypothesis writing and report writing</p> <ol style="list-style-type: none"> <li>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.</li> <li>Critically formulate the research design and sampling design suitable for the problem.</li> <li>Communicate orally and written for the research problem, research design, sampling techniques.</li> <li>Design a report to communicate the findings and suggestion to make business decision.</li> <li>Demonstrate the ability to choose methods appropriate to research aims and objectives.</li> </ol>
22.	19CCU402	Cost Accounting	<ol style="list-style-type: none"> <li>Understand the cost concepts, types of costing methods and book keeping for cost accounting</li> <li>Apply tools and techniques to calculate cost and solve the problems.</li> <li>Select the best methods of costing by critically analysing and apply the same to appropriate situation</li> <li>Communicate orally and in written the cost concepts</li> <li>Gain the lifelong learning of cost concepts and apply in the business environment.</li> <li>Correctly analyze the cost of both the process and operations.</li> </ol>
23.	19CCU403A	Financial Analysis and Reporting	<ol style="list-style-type: none"> <li>Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</li> <li>Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>Critically evaluate the results of the tools applied, interpret the result.</li> <li>Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>Understand the overall health of an organization as well as to evaluate financial performance and business value</li> <li>Demonstrate knowledge of management accounting concepts and techniques</li> </ol>
24.	19CCU403B	HTML Programming	<ol style="list-style-type: none"> <li>Familiarize on the HTML sample documents and its platform and apply the learning for lifelong.</li> <li>Use the HTML CSS Files Operators, arrays and functions</li> <li>Understand usage of HTML forms and Create HTML image maps</li> <li>Critically analyse the need and create the HTML functions required for the situation.</li> <li>Write the program and present orally and in written form.</li> <li>Use critical thinking skills to design and create websites.</li> </ol>

25.	19CCU411	Research Methodology (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>2. Analyse the research problem and design the instruments to capture data, analyse the same using appropriate statistical techniques, and apply the learning lifelong.</li> <li>3. Critically evaluate the appropriate scales and measurement to be used for capturing data.</li> <li>4. Communicate in written form and prepare report to support decision making.</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Provides training in choosing methods materials.</li> </ol>
26.	19CCU412A	Financial Analysis and Reporting (Practical)	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>3. Critically evaluate the results of the tools applied, interpret the result.</li> <li>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>5. Utilize the knowledge of financial statement analysis for lifelong.</li> <li>6. Define bookkeeping and accounting and its general purposes.</li> </ol>
27.	19CCU412B	HTML Programming (Practical)	<ol style="list-style-type: none"> <li>1. Create HTML document</li> <li>2. To format and create links in HTML document</li> <li>3. Create Webpage with multiple frames</li> <li>4. Use various types of list, images and tags to create HTML Document and apply the learning for lifelong.</li> <li>5. Create forms using various input types.</li> <li>6. Critically analyse the need and create the HTML functions required for the situation.</li> <li>7. Write the program and prepare the report.</li> </ol>
28.	19CCU501A	Company Law	<ol style="list-style-type: none"> <li>1. Understand the Concept of laws related to constitution of company, finance structure, management team.</li> <li>2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.</li> <li>3. Analyse few real time cases relevant to company laws</li> <li>4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.</li> <li>5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.</li> <li>6. Learning about raising of capital by companies in compliance with SEBI regulations</li> </ol>
29.	19CCU501B	Financial Management	<ol style="list-style-type: none"> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Analyse the alternatives using appropriate tools and techniques.</li> <li>3. Solve the problems and take decisions based on the result.</li> <li>4. Communicate orally and in written form the concepts and solutions.</li> <li>5. Analyse cases in a team and exhibit leadership skills.</li> <li>6. Relate capital investment decisions and financial policies to business valuations.</li> </ol>
30.	19CCU502A	Management Accounting	<ol style="list-style-type: none"> <li>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</li> <li>2. Comprehend on the contemporary issues relevant to accounting concepts.</li> <li>3. Analyse the alternatives using appropriate tools and techniques.</li> <li>4. Solve the problems and take decisions based on the result.</li> <li>5. Communicate orally and in written form the concepts and solutions.</li> <li>6. Help to do standard variation analysis through standard costs</li> </ol>
31.	19CCU502B	Advanced Accounting	<ol style="list-style-type: none"> <li>1. Understand the accounting for advanced issues in partnership, BFSI sector and special transaction.</li> <li>2. Comprehend on the working of accounting standards</li> <li>3. Solve the problems and take decisions based on the result.</li> <li>4. Understand the accounting for advanced corporate issues that could be applied lifelong.</li> <li>5. Communicate orally and in written form the concepts and solutions.</li> <li>6. Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.</li> </ol>
32.	19CCU503A	Object Oriented Programming with C++	<ol style="list-style-type: none"> <li>1. Understand the concept of OOPS with C++ and apply the learning for lifelong.</li> <li>2. Familiarize on the classes, objects, pointers</li> <li>3. Critically analyse the need and develop the program in OOPS with C++ required for the situation.</li> <li>4. Write the program and present orally and in written form.</li> <li>5. Be familiar with the application of the Unified Modelling Language (UML) towards analysis and design.</li> <li>6. Write the simple C++ programs using the variables, operators, control structures, functions and I/O objects <math>C_{in}</math> and <math>C_{out}</math></li> </ol>
33.	19CCU503B	Investment Management	<ol style="list-style-type: none"> <li>1. Understand the Concept of investing and mechanics for formulating investment decisions.</li> <li>2. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.</li> <li>3. Apply the investing concepts and skills lifelong.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Analyze and evaluate equity securities through examination of economic activity, industry analysis financial statement analysis and individual firm valuation.</li> <li>5. Debate issues in efficient markets considering technical analysis and efficient markets and anomalies.</li> <li>6. Analyze and explain fixed-income and leveraged securities including bond valuation, duration and reinvestment concepts, and convertible securities and warrants.</li> </ol>
34.	19CCU504A	Business Economics	<ol style="list-style-type: none"> <li>1. Understand the Concept of micro and macroeconomic factors and its application in business.</li> <li>2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.</li> <li>3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.</li> <li>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.</li> <li>5. Gain knowledge on Monetary theory, measures by RBI in controlling interest rate and emerging concepts like Bit Coin.</li> <li>6. Gain knowledge of elementary accounting concepts used for preparing balance sheet and interpretation of balance sheet.</li> </ol>
35.	19CCU504B	Management and Organization Behaviour	<ol style="list-style-type: none"> <li>1. Understand the Concept of management, Behaviour as individual, group and organization.</li> <li>2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.</li> <li>3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.</li> <li>4. Evaluate the appropriateness of various leadership styles and conflict management strategies used in organizations.</li> <li>5. Describe and assess the basic design elements of organizational structure and evaluate their impact on employees.</li> <li>6. Explain how organizational change and culture affect working relationships within organizations.</li> </ol>
36.	19CCU511A	Object Oriented Programming with C++ (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of OOPS with C++, classes, objects, pointers, working with file and apply the learning for lifelong.</li> <li>2. Develop Program using the Classes, objects and pointers.</li> <li>3. Critically analyse the need and develop the program in OOPS with C++ required for the situation.</li> <li>4. Write the program and present orally and in written form.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Be familiar with the application of the Unified Modelling Language (UML) towards analysis and design.</li> <li>6. Write the simple C++ programs using the variables, operators, control structures, functions and I/O objects <math>C_{in}</math> and <math>C_{out}</math>.</li> </ol>
37.	19CCU511B	Investment Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the Concept of investing and mechanics for formulating investment decisions.</li> <li>2. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.</li> <li>3. Apply the investing concepts and skills lifelong.</li> <li>4. Analyze and evaluate equity securities through examination of economic activity, industry analysis financial statement analysis and individual firm valuation.</li> <li>5. Debate issues in efficient markets considering technical analysis and efficient markets and anomalies.</li> <li>6. Analyze and explain fixed-income and leveraged securities including bond valuation, duration and reinvestment concepts, and convertible securities and warrants.</li> </ol>
38.	19CCU512A	Business Economics (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the micro and macroeconomic concepts and its application in business</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills.</li> <li>6. Gain knowledge of elementary accounting concepts used for preparing balance sheet and interpretation of balance sheet.</li> </ol>
39.	19CCU512B	Management and Organization Behaviour (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the management, behaviour of individual, group and organisation and its application in business</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Explain how organizational change and culture affect working relationships within organizations.</li> </ol>
40.	19CCU601A	Taxation	<ol style="list-style-type: none"> <li>1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws, indirect taxes emphasizing GST and customs law.</li> <li>2. Formulate the Income Tax calculations by critically analysing the assessee's situation under various income heads and deductions and acquire a Lifelong</li> </ol>

			<p>practice for computation of Tax under various income heads and deductions for any assessee</p> <ol style="list-style-type: none"> <li>3. Comprehend on the assessment of the GST</li> <li>4. Communicate orally and in written form the income tax, GST and customs law and computations of IT.</li> <li>5. Understand with the laws pertaining to the Income Tax and its apply it lifelong.</li> <li>6. 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)</li> </ol>
41.	19CCU601B	Internet and Web Designing	<ol style="list-style-type: none"> <li>1. Understand the concept of internet and World wide web.</li> <li>2. Familiarize on the PHP, DHTML, MySQL and JavaScript usage and apply the learning lifelong.</li> <li>3. Design the web page using the PHP, DHTML, MySQL and JavaScript</li> <li>4. Critically analyse the requirement and create the webpage required for the situation.</li> <li>5. Write the program and present orally and in written form.</li> <li>6. Students will develop and understanding of information design and usability as it applies to interactive media projects.</li> </ol>
42.	19CCU602A	Entrepreneurship	<ol style="list-style-type: none"> <li>1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>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.</li> <li>3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>4. Student will able to understand the importance and role of ethical, sustainability, innovation and global issues for strategic decision making.</li> <li>5. 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.</li> <li>6. 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.</li> </ol>
43.	19CCU602B	Personal Selling and Salesmanship	<ol style="list-style-type: none"> <li>1. Understand the Concept of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>3. 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.</li> <li>4. Designed to facilitate learning the essentials of salesmanship.</li> <li>5. Aid in developing skills required in planning and executing sales process.</li> <li>6. Ensure efficient and effective understanding and performance in all spheres of selling.</li> </ol>
44.	19CCU603A	Human Resource Management	<ol style="list-style-type: none"> <li>1. Understand the Concept of Human Resource Management, Human Resource Planning, Recruitment, performance appraisal and employee relations.</li> <li>2. Communicate orally and in written form the understanding of Human Resource Management, Human Resource Planning, Recruitment, performance appraisal and employee relations.</li> <li>3. Apply the understanding of Human Resource Management, Human Resource Planning, Recruitment, performance appraisal and employee relations in lifelong practice.</li> <li>4. Analyse the strategic issues and strategies required to select and develop manpower resources.</li> <li>5. Analyse the strategic issues and strategies required to select and develop manpower resources.</li> <li>6. To develop necessary skill set for application of various HR issues.</li> </ol>
45.	19CCU603B	Management Information system	<ol style="list-style-type: none"> <li>1. Understand the usage of information system in management decision.</li> <li>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision</li> <li>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</li> <li>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</li> <li>5. Apply the understanding of the usage of information system in management decision as a lifelong practice.</li> <li>6. Understand the various business models being implemented in electronic commerce and how they can be used support organizational strategies.</li> </ol>
46.	19CCU611A	Taxation (Practical)	<ol style="list-style-type: none"> <li>1. Understand the Concept of direct taxes, indirect taxes and its application.</li> <li>2. Know how to e-filing of IT, register GST and apply the GST provisions.</li> <li>3. Communicate orally and in written form the direct, indirect taxations concepts and provisions.</li> <li>4. Familiarise with the standards and laws pertaining to the Income Tax, GST and customs and apply the knowledge lifelong.</li> <li>5. Understand with the laws pertaining to the Income Tax and apply it lifelong.</li> </ol>

			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).
47.	19CCU611B	Internet and Web Designing (Practical)	<ol style="list-style-type: none"> <li>1. Familiarize on the PHP, DHTML, MySQL and JavaScript usage and apply the learning lifelong</li> <li>2. Design a webpage using PHP, DHTML, MySQL and JavaScript</li> <li>3. Critically analyse the requirement and create the webpage required for the situation.</li> <li>4. Write the program and present orally and in written form.</li> <li>5. Write the program and present orally and in written form.</li> <li>6. Students will develop and understanding of information design and usability as it applies to interactive media projects.</li> </ol>
48.	19CCU612A	Entrepreneurship (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the entrepreneurship, idea creation, starting up new ventures, business plan and applying for funding and patent.</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.</li> <li>4. Communicate in oral and written form and prepare business plan and the report.</li> <li>5. Work in team and exhibit leadership skills.</li> <li>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.</li> </ol>
49.	19CCU612B	Personal Selling and Salesmanship (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</li> <li>2. Analyse the case studies, understand the selling process and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Designed to facilitate learning the essentials of salesmanship.</li> </ol>
50.	19CCU613A	Human Resource Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the Human resource management and HR practices in real organization.</li> <li>2. Analyse the case studies, HR process and apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives methods for HR practices and select the best methods suiting the situation.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> </ol>

			6. To develop necessary skill set for application of various HR issues.
51.	19CCU613B	Management Information system (Practical)	<ol style="list-style-type: none"> <li>1. Understand the usage of information system in management decision.</li> <li>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision</li> <li>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</li> <li>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</li> <li>5. Apply the understanding of the usage of information system in management decision lifelong practice.</li> <li>6. Understand the various business models being implemented in electronic commerce and how they can be used support organizational strategies.</li> </ol>
52.	19CCU691	Project	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand the application of Research process in the area of accounting / Finance / Marketing / HR / International business etc.</li> <li>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</li> <li>4. Apply the theoretical and practical learning of doing research into lifelong practice.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> <li>7. Utilize the IT application for analysis and preparation of report.</li> </ol>

Name of the Department: **Commerce**

**Course:** B. Com BPS

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LAU101	Language - I	<ol style="list-style-type: none"><li>1. Complete introduction to 'History of Tamil Literature', which is an optional subject in competitive examinations such as Indian Citizenship.</li><li>2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.</li><li>3. 'Scientific Tamil', the field of development of Tamil; Development of multi-pronged research thinking on 'Internet Tamil'.</li><li>4. Having creative self-improvement and creativity development for employment.</li><li>5. An attitude of seeking literature in support of social and biological values.</li><li>6. Skill development for translation based employment.</li></ol>
2.	19ENU101	English – I	<ol style="list-style-type: none"><li>1. Retrieve fundamentals of English language to construct error free sentences.</li><li>2. Develop the knowledge of interpersonal skills.</li><li>3. Establish and maintain social relationships.</li><li>4. Develop communication skills in business environment.</li><li>5. Refine communication competency through LSRW skills.</li><li>6. Improving intrapersonal skills through literary works.</li></ol>
3.	19BPU101	Financial Accounting	<ol style="list-style-type: none"><li>1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.</li><li>2. To know about the accounting process and preparation of final accounts</li><li>3. To learn and apply the inventory valuation.</li><li>4. To understand and apply the techniques for preparing accounts in different business organizations like consignment, joint venture and Non – trading concern.</li><li>5. To know the accounting procedure for branches and also to ascertain the financial position of each branch separately.</li><li>6. To learn and apply the accounting procedures for partnership firm.</li></ol>
4.	19BPU102	Management and Organization Behaviour	<ol style="list-style-type: none"><li>1. Understand the Concept of management, Behaviour as individual, group and organization.</li><li>2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.</li><li>3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.</li><li>4. Apply the Organizational behaviour and personality</li><li>5. Describe the leadership theories</li><li>6. Apply the concept of team work, Conflicts and Organizational Change</li></ol>

5.	19AEC101	Business Communication	<ol style="list-style-type: none"> <li>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</li> <li>2. Draft business correspondence for the organization requirement.</li> <li>3. Prepare business reports for organization needs.</li> <li>4. Use appropriate technology for business communication.</li> <li>5. Draft the resume and to develop skills to face the interview</li> <li>6. Improved the communication skill of students</li> </ol>
6.	19BPU111	Management and Organization Behaviour (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the management, behaviour of individual, group and organisation and its application in business</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Gained insight about the team work</li> </ol>
7.	19LAU201	Language – II	<ol style="list-style-type: none"> <li>1. Complete introduction to ‘History of Tamil Literature’, which is an optional subject in competitive examinations such as Indian Citizenship.</li> <li>2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.</li> <li>3. ‘Scientific Tamil’, the field of development of Tamil; Development of multi-pronged research thinking on ‘Internet Tamil’.</li> <li>4. Having creative self-improvement and creativity development for employment.</li> <li>5. An attitude of seeking literature in support of social and biological values.</li> <li>6. Skill development for translation based employment.</li> </ol>
8.	19ENU201	English – II	<ol style="list-style-type: none"> <li>1. Strengthen the foundation of the language to elevate the command of standard grammar.</li> <li>2. Inculcate the proper communication strategy.</li> <li>3. Formulate and communicate persuasive arguments for specific business outcome.</li> <li>4. Apply fundamentals of language for reading, writing and effective communication.</li> <li>5. Standardize and demonstrate understanding of LSRW skills.</li> <li>6. Introduce literature to enhance the moral and aesthetic values.</li> </ol>
9.	19BPU201	Business Process Services in Finance and Accounting	<ol style="list-style-type: none"> <li>1. Understand the finance and accounting concept and the need to outsource finance and accounting activities</li> <li>2. Comprehend the standards pertaining to the accounting, compliances like SOX and internal audit framework like COSO.</li> <li>3. Understand the mechanics of purchase, inventory control, accounts payables-receivables and General ledger in the F &amp; A Technology.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Communicate orally and in written form the mechanics of purchase, inventory control, accounts payables-receivables and General ledger in the F &amp; A Technology.</li> <li>5. Gain a lifelong learning for applying the F&amp;A Technology in BPS business.</li> <li>6. Acquire knowledge about the GAAP in different countries</li> </ol>
10.	19BPU202	Business Analytics	<ol style="list-style-type: none"> <li>1. Utilize the concept of matrices, differential calculus to solve business problems</li> <li>2. Calculate and apply the measure of central tendency and dispersion in decision making.</li> <li>3. Evaluate the relationship and association between variables to formulate the strategy in business.</li> <li>4. Apply the concept of index numbers and trend analysis in business decisions.</li> <li>5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.</li> <li>6. Acquire knowledge about the sampling estimation</li> </ol>
11.	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> <li>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.</li> </ol>
12.	19BPU211	Business Process Services in Finance and Accounting (Practical)	<ol style="list-style-type: none"> <li>1. Understand the finance and accounting concept and the need to outsource finance and accounting activities</li> <li>2. Comprehend the standards pertaining to the accounting, compliances like SOX and internal audit framework like COSO.</li> <li>3. Understand the mechanics of purchase, inventory control, accounts payables-receivables and General ledger in the F &amp; A Technology.</li> <li>4. Communicate orally and in written form the mechanics of purchase, inventory control, and General ledger in the F &amp; A Technology.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Gain a lifelong learning for applying the F&amp;A Technology in BPS business.</li> <li>6. Communicate orally and in written form the mechanics of accounts payables-receivables in the F &amp; A Technology.</li> </ol>
13.	19BPU212	Computer Applications for Business (Practical)	<ol style="list-style-type: none"> <li>1. Prepare documents and reports for the organization.</li> <li>2. Prepare datasheet and apply the built-in functions for analyzing the data to support decision making.</li> <li>3. Utilize visual aids and tools to present the data</li> <li>4. Design the presentations for the business meetings</li> <li>5. Store, retrieve data and make decisions based on the information.</li> <li>6. Exhibit the communication skills to convey the outputs produced.</li> </ol>
14.	19BPU301	Supply Chain Management	<ol style="list-style-type: none"> <li>1. Comprehend on the Current Trend in SCM Outsourcing.</li> <li>2. Process views of Supply chain and Procurement Practice.</li> <li>3. Familiar with the Supply Chain Phases and Technology Intervention</li> <li>4. Obtain the knowledge on Requirement and Master Data Management</li> <li>5. Enrich with the Logistics Fleet, Warehouse and Inventory Management</li> <li>6. Acquire knowledge about the inventory management</li> </ol>
15.	19BPU302	Income Tax Law and Practices	<ol style="list-style-type: none"> <li>1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.</li> <li>2. Compute Income Tax Returns.</li> <li>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</li> <li>4. Communicate orally and in written the Income tax computation under various income heads and deductions.</li> <li>5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.</li> <li>6. Compute business and gain from business and profession</li> </ol>
16.	19BPU303	Cost and Management Accounting	<ol style="list-style-type: none"> <li>1. Students will have the knowledge about cost accounting and book keeping system.</li> <li>2. Students will be capable of calculating wages and ascertaining overhead cost.</li> <li>3. Students will have expertise in analyzing and interpreting financial statement.</li> <li>4. Students will be capable of preparing cash flow and fund flow statements.</li> <li>5. Students will have the understanding above marginal costing and budgeting.</li> <li>6. Describe the preparation of cost sheet</li> </ol>
17.	19BPU304A	Principles of Auditing	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of auditing,</li> <li>2. Recall the audit techniques and practices.</li> <li>3. Apply lifelong the key learning of best auditing process.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Communicate orally and in written form the auditing concept and techniques in business.</li> <li>5. Familiar with the standards and laws pertaining to the auditing.</li> <li>6. Learn the preparation of audit report</li> </ol>
18.	19BPU304B	Business Process Services in Insurance	<ol style="list-style-type: none"> <li>1. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.</li> <li>2. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.</li> <li>3. Communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning.</li> <li>4. Apply the learning of the insurance procedures, products, services and operations lifelong.</li> <li>5. Comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk.</li> <li>6. Acquire knowledge about the Life Insurance and Annuity</li> </ol>
19.	19BPU311A	Principles of Auditing (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.</li> <li>2. Classify and apply vouching, verification and valuation technique to appropriate situation</li> <li>3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.</li> <li>4. Communicate orally and in written form about the findings and solution.</li> <li>5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.</li> <li>6. Analyze the provisions amended to the appoint of auditor and audit in Companies Act.</li> </ol>
20.	19BPU311B	Business Process Services in Insurance (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept, products, services, regulatory body and laws pertaining to insurance.</li> <li>2. Analyse the features of the insurance and apply the theoretical learning into lifelong practice of BPS industry.</li> <li>3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.</li> <li>4. Comprehend and apply the laws related to insurance.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in teams and exhibit leadership skills</li> </ol>
21.	19BPU401	Indirect Taxation	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of indirect taxes emphasizing GST, CGST/IGST/SGST/UTGST and customs law.</li> <li>2. Comprehend and compute GST liabilities.</li> <li>3. Know the procedure to register GST and apply GST provisions to business situations.</li> <li>4. Communicate orally and in written form the indirect taxations concepts and provisions.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application.</li> <li>6. Understand the concept of time, value and place taxable supply</li> </ol>
22.	19BPU402	Campus to Corporate Transition	<ol style="list-style-type: none"> <li>1. Understand the corporate and BPS industry growth in India.</li> <li>2. Comprehend on the requirement of the industry like attitude, language, behaviour, body language, learning style etc.</li> <li>3. Train the student on corporate etiquettes, professional skills, English language.</li> <li>4. Equip the students to draft resume, face the Group discussion and interview.</li> <li>5. Communicate efficiently in oral and in written form as expected by the BPS industry.</li> <li>6. Acquire knowledge about the difference between campus and corporate</li> </ol>
23.	19BPU403	Retail CPG and Market Research	<ol style="list-style-type: none"> <li>1. Understand the concept of marketing research, consumer goods, retailing and media research and its application in BPS industry.</li> <li>2. Analyse the classification of FMCG industry, Retails formats and media research options and apply the learning lifelong.</li> <li>3. Critically formulate the research design for media research and retail research and understand ways to evaluate the best alternative.</li> <li>4. Communicate orally and written form the concept of marketing research, consumer goods, retailing and media research and its application in BPS industry.</li> <li>5. Design a report to communicate the findings and suggestion to make business decision.</li> <li>6. Acquire knowledge about the media research</li> </ol>
24.	19BPU404A	Financial Analysis and Reporting	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>3. Critically evaluate the results of the tools applied, interpret the result.</li> <li>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>5. Utilize the knowledge of financial statement analysis for lifelong.</li> <li>6. Understand the financial position of the firms</li> </ol>
25.	19BPU404B	Business Process Services in Banking	<ol style="list-style-type: none"> <li>1. Understand the Concept of banking operations, functions, risk associated with and law pertaining to banking functions,</li> <li>2. Comprehend on the banking system, its regulatory body related to banks that facilitates the BPS process.</li> <li>3. Communicate orally and in written form the understanding of banking operations, functions, risk associated with and law pertaining to banking functions</li> </ol>

			<ol style="list-style-type: none"> <li>4. Apply the learning of the bank functions and operations lifelong practice in BPS.</li> <li>5. Acquire knowledge about the basics of cards</li> <li>6. Gain understanding about the bank procedures in International Trade</li> </ol>
26.	19BPU411A	Financial Analysis and Reporting (Practical)	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>3. Critically evaluate the results of the tools applied, interpret the result.</li> <li>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>5. Utilize the knowledge of financial statement analysis for lifelong.</li> <li>6. Understand the financial position of the firms</li> </ol>
27.	19BPU411B	Business Process Services in Banking (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept, products, services, regulatory body and laws pertaining to banking Practice and its application in BPS.</li> <li>2. Analyse the features of the banking apply the theoretical learning into lifelong practice in BPS sector.</li> <li>3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.</li> <li>4. Comprehend and apply the laws related to banking.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in teams and exhibit leadership skills</li> </ol>
28.	19BPU501A	Services Marketing	<ol style="list-style-type: none"> <li>1. Understand the Concept of Services marketing, and 6Ps of Services Marketing</li> <li>2. Communicate orally and in written form the concepts of Services marketing and 6 Ps of Services marketing</li> <li>3. Apply the Services marketing concepts and skills lifelong.</li> <li>4. Acquire knowledge about the importance of service delivery</li> <li>5. understand the service strategies for health and education</li> <li>6. Understand the service strategy for hospitality , tourism, Transportation, Information Technology</li> </ol>
29.	19BPU501B	Business Process Services in Capital Market	<ol style="list-style-type: none"> <li>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.</li> <li>2. Calculate the NAV and analyse the performance of mutual fund scheme</li> <li>3. Apply the hedge fund strategies and fund accounting principles along with theoretical knowledge of capital market in BPS operations.</li> <li>4. Communicate orally and in written form the understanding of capital markets in domestic and global scenario, the securities traded, Investment management,</li> </ol>

			<p>private equity, mutual fund and hedge funds and its application.</p> <p>5. Apply the knowledge of capital market operations, in lifelong practice at BPS sector.</p> <p>6. Acquire knowledge about the market risk management.</p>
30.	19BPU502A	Business Law	<p>1. Identify the basic legal principles behind contractual agreements.</p> <p>2. Understand the relevance of business law in economic and social context.</p> <p>3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.</p> <p>4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.</p> <p>5. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.</p> <p>6. Gain knowledge about the partnership Act 1932</p>
31.	19BPU502B	Managing Business Processes - I	<p>1. Understand the Concept of business process, its need in India.</p> <p>2. Evaluate the BPS business and operation using metrics.</p> <p>3. Understand and apply various techniques of process mapping in BPS sector.</p> <p>4. Understand the risk types and apply various techniques to mitigate risk.</p> <p>5. Communicate orally and in written form the understanding of managing the business process using various techniques.</p> <p>6. Acquire knowledge about the understanding of the customer expectation in outsourcing</p>
32.	19BPU503A	Marketing Management	<p>1. Understand the Concept of marketing, and 4Ps of Marketing</p> <p>2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing</p> <p>3. Apply the marketing concepts and skills lifelong.</p> <p>4. Acquire knowledge about the market segmentation</p> <p>5. Gain insight about the product management</p> <p>6. Describe pricing and distribution management</p>
33.	19BPU503B	Research Methodology	<p>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</p> <p>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.</p> <p>3. Critically formulate the research design and sampling design suitable for the problem.</p> <p>4. Communicate orally and written for the research problem, research design, sampling techniques.</p> <p>5. Design a report to communicate the findings and suggestion to make business decision</p> <p>6. Learn the concept of measurement and scaling in research</p>
34.	19BPU504A	Business Economics	<p>1. Understand the Concept of micro and macroeconomic factors and its application in business.</p>

			<ol style="list-style-type: none"> <li>2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.</li> <li>3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.</li> <li>4. Describe the demand and supply function</li> <li>5. Gain insight about the production, cost and revenue function</li> <li>6. Acquire knowledge about the market competition</li> </ol>
35.	19BPU504B	Management Information System	<ol style="list-style-type: none"> <li>1. Understand the usage of information system in management decision.</li> <li>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision</li> <li>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</li> <li>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</li> <li>5. Apply the understanding of the usage of information system in management decisions a lifelong practice.</li> <li>6. To acquire knowledge about the Strategic Management Information System.</li> </ol>
36.	19BPU511A	Marketing Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the marketing, 4-s of marketing and its application in real business situation,</li> <li>2. Analyse the business case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Gain knowledge about the brands and brand strategy of the firms</li> </ol>
37.	19BPU511B	SPSS (Practical)	<ol style="list-style-type: none"> <li>1. Create datasheet and enter the data</li> <li>2. Compute descriptive statistics using the package and graphically represent the data.</li> <li>3. Perform univariate and bivariate analysis in the software package.</li> <li>4. Perform multivariate analysis in the software package.</li> <li>5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.</li> <li>6. Acquire knowledge about the parametric and non-parametric test</li> </ol>
38.	19BPU601A	Human Resource Management	<ol style="list-style-type: none"> <li>1. Students will be familiarized with basic concept of HRM.</li> <li>2. Students will be capable of acquiring human resource.</li> <li>3. Students will be capable of organizing and conducting training and development programmes.</li> <li>4. Students will have the sound knowledge of performance of appraisal system.</li> <li>5. Students will be capable of handling grievances of employees and industrial disputes.</li> <li>6. Learn about the Industrial disputed and maintenance</li> </ol>

39.	19BPU601B	Managing Business Processes – II	<ol style="list-style-type: none"> <li>1. Understand the quality standards and quality assurance.</li> <li>2. Comprehend and utilize the tools and techniques to reduce the defect.</li> <li>3. Gain knowledge of problem-solving techniques and apply the same in BPS sector.</li> <li>4. Understand the Lean and six sigma concept and its application in managing the business processes.</li> <li>5. Communicate orally and in written form the understanding of managing the business process using various techniques.</li> <li>6. Learn about the transaction monitoring process</li> </ol>
40.	19BPU602A	Company Law	<ol style="list-style-type: none"> <li>1. Understand the Concept of laws related to constitution of company, finance structure, management team.</li> <li>2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.</li> <li>3. Analyse few real time cases relevant to company laws</li> <li>4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.</li> <li>5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.</li> <li>6. Apply the knowledge about the company directors</li> </ol>
41.	19BPU602B	Financial Management	<ol style="list-style-type: none"> <li>1. Students will be familiarized with basic concepts of financial management.</li> <li>2. Students will know the technicalities of making investment decisions.</li> <li>3. Students will be capable of making financing decisions.</li> <li>4. Students will be familiarized with concepts of dividend decisions.</li> <li>5. Students will be capable of making working capitalization and cash management</li> <li>6. Learn about the capital structure theories</li> </ol>
42.	19BPU603A	Entrepreneurship	<ol style="list-style-type: none"> <li>1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>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.</li> <li>3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>4. Acquire knowledge about the types of business entities</li> <li>5. Gain insight about the sources of business ideas and feasibility studies</li> <li>6. Demonstrate mobilizing resources for start-ups</li> </ol>
43.	19BPU603B	Excel for Business	<ol style="list-style-type: none"> <li>1. Understand the features of Spreadsheet applications and functions.</li> <li>2. Comprehend and apply computer tools and inbuilt functions on raw data.</li> <li>3. Communicate orally and in written form the features of spreadsheet applications and functions.</li> <li>4. Utilize the expertise of the Excel features and functions as a lifelong practice.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Acquire knowledge about data analysis</li> <li>6. Gain insight about the advanced function in MS EXCEL and PIVOT TABLE</li> </ol>
44.	19BPU611A	Entrepreneurship (Practical)	<ol style="list-style-type: none"> <li>1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>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.</li> <li>3. Apply the understanding of entrepreneurship, types of entrepreneurs,</li> <li>4. Acquire knowledge about the entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>5. Learn about the sources of business ideas and feasibility studies</li> <li>6. Gain insight about the IPR, Patent and Copyright</li> </ol>
45.	19BPU611B	Excel for Business (Practical)	<ol style="list-style-type: none"> <li>1. Create and format the data in excel sheet</li> <li>2. Utilize all the inbuilt, functions and formulas and analyses the data.</li> <li>3. Critically analyze the data using the what-if, solver and pivot functions.</li> <li>4. Communicate the outputs in written form identifying the objective and outcome of each exercise.</li> <li>5. Apply the practice of utilization of spreadsheets lifelong learning for data analysis and decision making.</li> <li>6. Understand the application of PIVOT Table</li> </ol>
46.	19BPU691	Project	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</li> <li>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</li> <li>4. Apply the theoretical and practical learning of doing research into lifelong practice.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> <li>7. Utilise the IT application for analysis and preparation of report</li> </ol>

Name of the Department: **Commerce**

**Course:** B. Com. PA

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LAU101	Language - I	<ol style="list-style-type: none"><li>1. Complete introduction to 'History of Tamil Literature', which is an optional subject in competitive examinations such as Indian Citizenship.</li><li>2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.</li><li>3. 'Scientific Tamil', the field of development of Tamil; Development of multi-pronged research thinking on 'Internet Tamil'.</li><li>4. Having creative self-improvement and creativity development for employment.</li><li>5. An attitude of seeking literature in support of social and biological values.</li><li>6. Skill development for translation based employment.</li></ol>
2.	19ENU101	English – I	<ol style="list-style-type: none"><li>1. Retrieve fundamentals of English language to construct error free sentences.</li><li>2. Develop the knowledge of interpersonal skills.</li><li>3. Establish and maintain social relationships.</li><li>4. Develop communication skills in business environment.</li><li>5. Refine communication competency through LSRW skills.</li><li>6. Improving intrapersonal skills through literary works.</li></ol>
3.	19PAU101	Financial Accounting	<ol style="list-style-type: none"><li>1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.</li><li>2. To know about the accounting process and preparation of final accounts</li><li>3. To learn and apply the inventory valuation.</li><li>4. To understand and apply the techniques for preparing accounts in different business organizations like consignment, joint venture and Non – trading concern.</li><li>5. To know the accounting procedure for branches and also to ascertain the financial position of each branch separately.</li><li>6. To learn and apply the accounting procedures for partnership firm.</li></ol>
4.	19PAU102	Business Law	<ol style="list-style-type: none"><li>1. Identify the basic legal principles behind contractual agreements.</li><li>2. Understand the relevance of business law in economic and social context.</li><li>3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.</li><li>4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.</li></ol>

			<ol style="list-style-type: none"> <li>5. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.</li> <li>6. Prepare various agreements related to contract</li> </ol>
5.	19AEC101	Business Communication	<ol style="list-style-type: none"> <li>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</li> <li>2. Draft business correspondence for the organization requirement.</li> <li>3. Prepare business reports for organization needs.</li> <li>4. Use appropriate technology for business communication.</li> <li>5. Draft the resume and to develop skills to face the interview</li> <li>6. Improved the communication skill of students</li> </ol>
6.	19LAU201	Language – II	<ol style="list-style-type: none"> <li>1. Complete introduction to ‘History of Tamil Literature’, which is an optional subject in competitive examinations such as Indian Citizenship.</li> <li>2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.</li> <li>3. ‘Scientific Tamil’, the field of development of Tamil; Development of multi-pronged research thinking on ‘Internet Tamil’.</li> <li>4. Having creative self-improvement and creativity development for employment.</li> <li>5. An attitude of seeking literature in support of social and biological values.</li> <li>6. Skill development for translation based employment.</li> </ol>
7.	19ENU201	English – II	<ol style="list-style-type: none"> <li>1. Strengthen the foundation of the language to elevate the command of standard grammar.</li> <li>2. Inculcate the proper communication strategy.</li> <li>3. Formulate and communicate persuasive arguments for specific business outcome.</li> <li>4. Apply fundamentals of language for reading, writing and effective communication.</li> <li>5. Standardize and demonstrate understanding of LSRW skills.</li> <li>6. Introduce literature to enhance the moral and aesthetic values.</li> </ol>
8.	19PAU201	Corporate Accounting	<ol style="list-style-type: none"> <li>1. Comprehend and apply the accounting process related corporate accounting</li> <li>2. Prepare final accounts for corporate entity.</li> <li>3. Understand the accounting standard and apply the same for corporate entity and amalgamation.</li> <li>4. Understand the difference of banking balance sheet and non-banking balance sheet</li> <li>5. Enhance the problem-solving skills and analytical skills in the accounting context.</li> <li>6. Enhance the problem-solving skills and analytical skills in the accounting context.</li> </ol>
9.	19PAU202	Business Mathematics and Statistics	<ol style="list-style-type: none"> <li>1. Utilize the concept of matrices, differential calculus to solve business problems</li> <li>2. Calculate and apply the measure of central tendency and dispersion in decision making.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Evaluate the relationship and association between variables to formulate the strategy in business.</li> <li>4. Apply the concept of index numbers and trend analysis in business decisions.</li> <li>5. Demonstrate capabilities as problem-solving and critical thinking</li> <li>6. Communication skills related to the discipline of statistics.</li> </ol>
10.	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> <li>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.</li> </ol>
11.	19ENU301	English – III	<ol style="list-style-type: none"> <li>1. Students learnt the basics and purposes of listening skill.</li> <li>2. Students will know the importance of speaking.</li> <li>3. Students developed the speaking skills on telephone, business and also in travel</li> <li>4. Learnt some effective vocabulary learning strategies.</li> <li>5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.</li> <li>6. Students will have honed the skills of communication which is needed for business purpose.</li> </ol>
12.	19PAU301	Cost Accounting	<ol style="list-style-type: none"> <li>1. Understand the cost concepts, types of costing methods and book keeping for cost accounting</li> <li>2. Apply tools and techniques to calculate cost and solve the problems.</li> <li>3. Select the best methods of costing by critically analyzing and apply the same to appropriate situation</li> <li>4. Communicate orally and in written the cost concepts</li> <li>5. Gain the lifelong learning of cost concepts and apply in the business environment.</li> <li>6. Reconcile Cost and Financial Accounting.</li> </ol>
13.	19PAU302	Income Tax Law and Practice	<ol style="list-style-type: none"> <li>1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.</li> <li>2. Compute Income Tax Returns.</li> </ol>

			<ol style="list-style-type: none"> <li>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</li> <li>4. Communicate orally and in written the Income tax computation under various income heads and deductions.</li> <li>5. Familiar with the laws pertaining to the Income Tax and it apply it lifelong.</li> <li>6. Prepare a statement of income for a person.</li> </ol>
14.	19PAU303A	Auditing and Corporate Governance	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of auditing, corporate governance and Corporate social responsibility (CSR)</li> <li>2. Recall the audit techniques, corporate governance and CSR practices.</li> <li>3. Apply lifelong the key learning of best auditing process, Corporate governance and CSR practices</li> <li>4. Communicate orally and in written form the auditing concept and techniques, Corporate governance and CSR concepts and practices in business.</li> <li>5. Familiar with the standards and laws pertaining to the auditing, Corporate Governance and CSR.</li> <li>6. Reminiscence with statistics on global reporting.</li> </ol>
15.	19PAU303B	Computerised Accounting System	<ol style="list-style-type: none"> <li>1. Comprehend on the knowledge of Tally, its features and its importance.</li> <li>2. Communicate orally and in written form the Features of Tally in capturing accounting procedures.</li> <li>3. Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.</li> <li>4. Familiarize on the incorporation of GST standards into accounting and computerised accounting process.</li> <li>5. Integrate accounting concepts and computer for effective decision making.</li> <li>6. Practical application of tally concepts in organizations.</li> </ol>
16.	19PAU311A	Auditing and Corporate Governance (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend and Analyse the Auditing standards and standards for the audit evidence.</li> <li>2. Classify and apply vouching, verification and valuation technique to appropriate situation</li> <li>3. Analyse and critically evaluate the case study and justify or prescribe a solution suitable.</li> <li>4. Communicate orally and in written form about the findings and solution.</li> <li>5. Work in teams and exhibit leadership skills and practice the learnings of auditing and corporate governance lifelong.</li> <li>6. Reminiscence with statistics on global reporting.</li> </ol>

17.	19PAU311B	Computerised Accounting System (practical)	<ol style="list-style-type: none"> <li>1. Familiarize on the accounts heads, vouching, inventory valuations, TDS and Pay roll process available in the accounting software</li> <li>2. Classify the items under items heads</li> <li>3. Generate the financial Reports, TDS and pay roll reports and evaluate the output.</li> <li>4. Communicate the outputs in written form identifying the objective and outcome of each exercise.</li> <li>5. To apply the utilization of computerised system as a lifelong learning.</li> <li>6. Practical application of tally concepts in organizations.</li> </ol>
18.	19ENU401	English – IV	<ol style="list-style-type: none"> <li>1. Students have acquired proficiency in communication.</li> <li>2. Students have become adept in written communication and presentation skills.</li> <li>3. Practice the skill of writing in English and that of public speaking.</li> <li>4. Establish and maintain social relationships.</li> <li>5. Develop communication skills in business environment.</li> <li>6. Refine communication competency through LSRW skills.</li> </ol>
19.	19PAU401	Research Methodology	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>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.</li> <li>3. Critically formulate the research design and sampling design suitable for the problem.</li> <li>4. Communicate orally and written for the research problem, research design, sampling techniques.</li> <li>5. Design a report to communicate the findings and suggestion to make business decision</li> <li>6. Provide suggestion to make business decision</li> </ol>
20.	19PAU402	Indirect Taxation	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of indirect taxes GST/CGST/IGST/SGST/UTGST and customs law.</li> <li>2. Comprehend and compute GST liabilities.</li> <li>3. Know the procedure to register GST and apply GST provisions to business situations.</li> <li>4. Communicate orally and in written form the indirect taxations concepts and provisions.</li> <li>5. Familiar with the standards and laws pertaining GST and customs and utilize for lifelong practical application.</li> <li>6. Application of GST provisions for business concerns.</li> </ol>
21.	19PAU403A	Financial Analysis and Reporting	<ol style="list-style-type: none"> <li>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</li> <li>2. Understand and apply tools and techniques to analyse the financial statement analysis.</li> <li>3. Critically evaluate the results of the tools applied, interpret the result.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Communicate orally and in written form the financial statement analysis, and results interpretation of the results.</li> <li>5. Preparation of statement of cash flow.</li> <li>6. Preparation of statement of fund flow.</li> </ol>
22.	19PAU403B	Excel for Business	<ol style="list-style-type: none"> <li>1. Understand the features of Spreadsheet applications and functions.</li> <li>2. Comprehend and apply computer tools and inbuilt functions on raw data.</li> <li>3. Communicate orally and in written form the features of spreadsheet applications and functions.</li> <li>4. Utilize the expertise of the Excel features and functions as a lifelong practice.</li> <li>5. Utilize the expertise of the Excel features and functions as a lifelong practice.</li> <li>6. Use shortcut methods in spreadsheet</li> </ol>
23.	19PAU411	Research Methodology (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>2. Analyse the research problem and design the instruments to capture data, analyse the same using appropriate statistical techniques, and apply the learning lifelong.</li> <li>3. Critically evaluate the appropriate scales and measurement to be used for capturing data.</li> <li>4. Communicate in written form and prepare report to support decision making.</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Problem solving and make better decisions.</li> </ol>
24.	19PAU412	Indirect Taxation (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend on the Concept of indirect taxes emphasizing GST/CGST/IGST/SGST/UTGST and customs law.</li> <li>2. Know the procedure to register GST and apply GST provisions to business situations.</li> <li>3. Communicate orally and in written form the indirect taxations concepts and provisions.</li> <li>4. Familiar with the standards and laws pertaining GST and customs and apply the knowledge lifelong.</li> <li>5. Application of GST provisions for business concerns.</li> <li>6. Comprehend and compute GST liabilities.</li> </ol>
25.	19PAU501A	Company Law	<ol style="list-style-type: none"> <li>1. Understand the Concept of laws related to constitution of company, finance structure, management team.</li> <li>2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.</li> <li>3. Analyse few real time cases relevant to company laws</li> <li>4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.</li> <li>5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.</li> <li>6. Online registration and online filing process of documents.</li> </ol>
26.	19PAU501B	Financial Management	<ol style="list-style-type: none"> <li>1. Understand the Concept of financial management, objective of financial management, the major four</li> </ol>

			<p>decisions taken by finance manager and its impact and enrich the lifelong learning.</p> <ol style="list-style-type: none"> <li>Analyse the alternatives using appropriate tools and techniques.</li> <li>Solve the problems and take decisions based on the result.</li> <li>Communicate orally and in written form the concepts and solutions.</li> <li>Analyse cases in a team and exhibit leadership skills.</li> <li>Plan and Manage the cash flows in companies.</li> </ol>
27.	19PAU502A	Management Accounting	<ol style="list-style-type: none"> <li>Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</li> <li>Comprehend on the contemporary issues relevant to accounting concepts.</li> <li>Analyse the alternatives using appropriate tools and techniques.</li> <li>Solve the problems and take decisions based on the result.</li> <li>Communicate orally and in written form the concepts and solutions.</li> <li>Making decisions based on the financial statement analysis.</li> </ol>
28.	19PAU502B	Advanced Accounting	<ol style="list-style-type: none"> <li>Understand the accounting for advanced issues in partnership, BFSI sector and special transaction.</li> <li>Comprehend on the working of accounting standards</li> <li>Solve the problems and take decisions based on the result.</li> <li>Understand the accounting for advanced corporate issues that could be applied lifelong.</li> <li>Communicate orally and in written form the concepts and solutions.</li> <li>Acquire knowledge on accounting procedure for branches and also to ascertain the financial position of each branch separately.</li> </ol>
29.	19PAU503A	Marketing Management	<ol style="list-style-type: none"> <li>Understand the Concept of marketing, and 4Ps of Marketing</li> <li>Communicate orally and in written form the concepts of marketing and 4 Ps of marketing</li> <li>Apply the marketing concepts and skills lifelong.</li> <li>Analyse the business case studies and try to apply the theoretical learning into lifelong practice.</li> <li>Critically evaluate the appropriate alternatives and draw a solution.</li> <li>Work in team and exhibit leadership skills</li> </ol>
30.	19PAU503B	Investment Management	<ol style="list-style-type: none"> <li>Understand the Concept of investing and mechanics for formulating investment decisions.</li> <li>Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.</li> <li>Apply the investing concepts and skills lifelong.</li> <li>Analyse the EIC framework make decisions based on investing in different avenues.</li> <li>Critically evaluate the risk return parameters and select the best alternative.</li> </ol>

			6. Communicate in written form and prepare report
31.	19PAU504A	Business Economics	<ol style="list-style-type: none"> <li>1. Understand the Concept of micro and macroeconomic factors and its application in business.</li> <li>2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.</li> <li>3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.</li> <li>4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>5. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
32.	19PAU504B	Management and Organization Behaviour	<ol style="list-style-type: none"> <li>1. Understand the Concept of management, Behaviour as individual, group and organization.</li> <li>2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.</li> <li>3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.</li> <li>4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>5. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
33.	19PAU511A	Marketing Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the marketing, 4-s of marketing and its application in real business situation,</li> <li>2. Analyse the business case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Apply the marketing concepts and skills lifelong.</li> </ol>
34.	19PAU511B	Investment Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the Investment Management and its application in real business situation,</li> <li>2. Analyse the business case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in written form and prepare report</li> <li>5. Apply the investing concepts and skills lifelong.</li> <li>6. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions</li> </ol>
35.	19PAU512A	Business Economics (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the micro and macroeconomic concepts and its application in business</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> </ol>

			<ol style="list-style-type: none"> <li>5. Work in team and exhibit leadership skills</li> <li>6. Analyse the case studies and try to apply the theoretical learning into lifelong practice</li> </ol>
36.	19PAU512B	Management and Organization Behaviour (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the management, behaviour of individual, group and organisation and its application in business</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Apply the Concept of management, Behaviour as individual, group and organization lifelong.</li> </ol>
37.	19PAU601A	Banking Law and Practice	<ol style="list-style-type: none"> <li>1. Understand the Concept of banking operations, functions, risk associated with and law pertaining to banking functions,</li> <li>2. Comprehend on the Indian banking system, its regulatory body and key macro indicators related to banks that affect the economy.</li> <li>3. Communicate orally and in written form the understanding of banking operations, functions, risk associated with and law pertaining to banking functions</li> <li>4. Apply the learning of the bank functions and operations lifelong.</li> <li>5. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.</li> <li>6. Comprehend and apply the laws related to banking.</li> </ol>
38.	19PAU601B	Insurance Law and Practice	<ol style="list-style-type: none"> <li>1. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.</li> <li>2. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.</li> <li>3. Communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning in India.</li> <li>4. Apply the learning of the insurance procedures, products, services and operations lifelong.</li> <li>5. Comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk in India.</li> <li>6. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.</li> </ol>
39.	19PAU602A	Entrepreneurship	<ol style="list-style-type: none"> <li>1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>5. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
40.	19PAU602B	Personal Selling and Salesmanship	<ol style="list-style-type: none"> <li>1. Understand the Concept of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</li> <li>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.</li> <li>3. Apply the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control in lifelong practice.</li> <li>4. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
41.	19PAU603A	Information System Control and Audit	<ol style="list-style-type: none"> <li>1. Understand the usage of information system in auditing.</li> <li>2. Critically analyse and evaluate the need of Information system audit for the business continuity</li> <li>3. Communicate orally and in written form the understanding of the usage of information system in auditing the business.</li> <li>4. Understand the security, ethical and regulatory issues pertaining to use of information technology in auditing.</li> <li>5. Apply the understanding of the usage of latest developed information system in auditing as a lifelong practice.</li> <li>6. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</li> </ol>
42.	19PAU603B	Strategic Management	<ol style="list-style-type: none"> <li>1. Understand the strategic management concept, strategic process, strategic evaluation and formulation techniques.</li> <li>2. Critically analyse and evaluate the internal and external environment using appropriate technique and formulate the strategy suitable for an organization.</li> <li>3. Communicate orally and in written form the understanding of strategic management concept, strategic process, strategic evaluation and formulation techniques.</li> <li>4. Apply the understanding of the strategic management concept, strategic process, strategic evaluation and formulation techniques in lifelong practice.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Understand the application of the latest concepts like Scrum framework , Agile methodology and design thinking</li> <li>6. Work in teams and exhibit leadership skills.</li> </ol>
43.	19PAU611A	Banking Law and Practice (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept, products, services, regulatory body and laws pertaining to banking Practice.</li> <li>2. Analyse the features of the banking apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.</li> <li>4. Comprehend and apply the laws related to banking.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in teams and exhibit leadership skills</li> </ol>
44.	19PAU611B	Insurance Law and Practice (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept, products, services, regulatory body and laws pertaining to insurance.</li> <li>2. Analyse the features of the insurance and apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.</li> <li>4. Comprehend and apply the laws related to insurance.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in teams and exhibit leadership skills</li> </ol>
45.	19PAU612A	Entrepreneurship (practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the entrepreneurship, idea creation, starting up new ventures, business plan and applying for funding and patent.</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.</li> <li>4. Communicate in oral and written form and prepare business plan and the report.</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> </ol>
46.	19PAU612B	Personal Selling and Salesmanship (practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and control.</li> <li>2. Analyse the case studies, understand the selling process and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives techniques for closing deal and select the best technique suiting the situation.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Apply the understanding of personal selling, theories of personal selling, motives of buying, selling process, sales planning and controlling lifelong practice</li> </ol>

47.	19PAU613A	Information System Control and Audit (Practical)1	<ol style="list-style-type: none"> <li>1. Understand the concept concepts and procedures of</li> <li>2. Information system</li> <li>3. Analyse the case studies, understand the cyber fraud and apply the theoretical learning into lifelong practice.</li> <li>4. Critically evaluate the appropriate alternatives techniques for</li> <li>5. control audit</li> <li>3. Communicate in oral and written form and prepare report</li> <li>4. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
48.	19PAU613B	Strategic Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the strategic management concept, strategic process, strategic evaluation and formulation techniques.</li> <li>2. Critically analyse and evaluate the internal and external environment using appropriate technique and formulate the strategy suitable for an organization.</li> <li>3. Understand the application of the latest concepts like Scrum framework , Agile methodology and design thinking</li> <li>4. Communicate orally and in written form the understanding of strategic management concept, strategic process, strategic evaluation and formulation techniques.</li> <li>5. Apply the understanding of the strategic management concept, strategic process, strategic evaluation and formulation techniques in lifelong practice.</li> <li>6. Work in teams and exhibit leadership skills.</li> </ol>
49.	19PAU691	Project	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</li> <li>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</li> <li>4. Apply the theoretical and practical learning of doing research into lifelong practice.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills Utilise the IT applications for analysis and preparation of report.</li> </ol>

Name of the Department: **Computer Applications**

**Course: BCA**

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LSU101	Language -I	<ol style="list-style-type: none"><li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li><li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li><li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li><li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li><li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li></ol>
2.	19CAU101	Programming Fundamentals using C / C++	<ol style="list-style-type: none"><li>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.</li><li>2. Develop programs using the basic elements like control statements, Arrays and Strings .</li><li>3. understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li><li>4. Understand about the code reusability with the help of user defined functions.</li><li>5. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</li><li>6. Understand the uses of preprocessors and various header file directives.</li></ol>
3.	19CAU102	Computer System Architecture	<ol style="list-style-type: none"><li>1. Students will acquire a basic knowledge about computer system architecture, arithmetic, digital circuits and the low - level programming skills.</li><li>2. Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.</li><li>3. Understand the inner workings and performance capabilities of microprocessors.</li><li>4. Understand the concept of registers and Instruction set.</li><li>5. Know the addressing modes and instruction format of various microprocessors.</li><li>6. Understand memory and I/O channels.</li></ol>

4.	19CAU103	Computer Fundamentals	<ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system,</li> <li>2. Define and distinguish Hardware and Software components of computer system,</li> <li>3. Explain and identify different computing machines during the evolution of computer system,</li> <li>4. Explain the functions of a computer,</li> <li>5. Identify the various input and output units and explain their purposes</li> <li>6. Understand the role of CPU and its components</li> </ol>
5.	19CAU111	Programming Fundamentals using C / C++ (Practical)	<ol style="list-style-type: none"> <li>1. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>2. Solve the memory access problems by using pointers</li> <li>3. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</li> <li>4. Understand the uses of preprocessors and various header file directives.</li> <li>5. Use the characteristics of an object-oriented programming language in a program.</li> <li>6. Implement File handling mechanisms.</li> </ol>
6.	19CAU112	Computer System Architecture (Practical)	<ol style="list-style-type: none"> <li>1. Students will acquire a basic knowledge about computer system architecture, arithmetic, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Analyze the use of encoder and decoder.</li> <li>4. Understand the working of half adder and full adder.</li> <li>5. Design and analyze memory, I/O devices and cache structures for processor.</li> <li>6. Evaluate the performance of computer systems.</li> </ol>
7.	19CAU113	Computer Fundamentals - Practical	<ol style="list-style-type: none"> <li>1. Modify text using various formatting options from the editing tools under the Home tab</li> <li>2. Demonstrate the mechanics and uses of Word tables to organize and present data.</li> <li>3. Demonstrate working knowledge of using Word's themes and clip art to create a variety of visual effects.</li> <li>4. Create and design a spreadsheet for general office use.</li> <li>5. Demonstrate the basic mechanics and navigation of an Excel spreadsheet.</li> <li>6. Demonstrate formatting techniques and presentation styles.</li> </ol>
8.	19AEC101	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing</li> </ol>

			<p>them, including interactions across local to global scales.</p> <p>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</p> <p>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</p>
9.	19LSU201	Language – II	<p>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</p> <p>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</p> <p>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</p> <p>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</p> <p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
10.	19ENU201	English	<p>1. Develop the knowledge of interpersonal skills.</p> <p>2. Establish and maintain social relationships.</p> <p>3. Genres of literature will give moral values of life.</p> <p>4. Develop communication skills in business environment</p> <p>5. Communication skills will get developed.</p> <p>6. Develop to have language competence.</p>
11.	19CAU201	Programming in JAVA	<p>1. Student will obtain knowledge of the structure and model of the Java programming language.</p> <p>2. Use looping and decision constructs to solve problems.</p> <p>3. Develop software in the Java programming language (application)</p> <p>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</p> <p>5. propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</p> <p>6. choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</p>
12.	19CAU202	Discrete Structures	<p>1. Familiar with elementary algebraic set theory.</p>

			<ol style="list-style-type: none"> <li>2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.</li> <li>3. Understand the basic principles of sets and operations in sets.</li> <li>4. Demonstrate an understanding of relations and functions and be able to determine their properties.</li> <li>5. Demonstrate different traversal methods for trees and graphs.</li> <li>6. Initiate to knowledge from inference theory.</li> </ol>
13.	19CAU203	Computer Networks And Internet Technologies	<ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> <li>3. Enumerate the layers of the OSI model and TCP/IP.</li> <li>4. Gain the skills and project-based experience needed for entry into web design and development careers.</li> <li>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</li> <li>6. Select and apply mark-up languages for processing, identifying, and presenting of information in web</li> </ol>
14.	19CAU211	Programming in JAVA - Practical	<ol style="list-style-type: none"> <li>1. Student will obtain knowledge of the structure and model of the Java programming language.</li> <li>2. How to use the Java programming language for various programming technologies (understanding)</li> <li>3. Develop software in the Java programming language (application)</li> <li>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</li> <li>5. propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</li> <li>6. choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</li> </ol>
15.	19CAU212	Discrete Structures - Practical	<ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.</li> <li>3. Understand the basic principles of sets and operations in sets.</li> <li>4. Demonstrate an understanding of relations and functions and be able to determine their properties.</li> <li>5. Demonstrate different traversal methods for trees and graphs.</li> <li>6. Initiate to knowledge from inference theory.</li> </ol>
16.	19CAU213	Computer Networks And Internet Technologies - Practical	<ol style="list-style-type: none"> <li>1. Gain the skills and project-based experience needed for entry into web design and development careers.</li> <li>2. Develop awareness and appreciation of the many ways that people access the web, and will be able to</li> </ol>

			<p>create standards-based websites that can be accessed by the full spectrum of web access technologies</p> <ol style="list-style-type: none"> <li>3. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages.</li> <li>4. Create and manipulate web media objects using editing software.</li> <li>5. Create web pages and validate input using JavaScript.</li> <li>6. Develop web pages and perform computation using JavaScript.</li> </ol>
17.	18CAU301	Data Structures	<ol style="list-style-type: none"> <li>1. Implement abstract data types for linear data structures.</li> <li>2. Apply the different linear and non-linear data structures to problem solutions.</li> <li>3. Analyze the applications of tree.</li> <li>4. Implement graph theory over various data structures.</li> <li>5. Critically analyze the various sorting algorithms.</li> <li>6. Able to use linear and non-linear data structures like stacks, queues, linked list etc.</li> </ol>
18.	18CAU302	Operating Systems	<ol style="list-style-type: none"> <li>1. Design various Scheduling algorithms.</li> <li>2. Apply the principles of concurrency.</li> <li>3. Design deadlock, prevention and avoidance algorithms.</li> <li>4. Compare and contrast various memory management schemes.</li> <li>5. Apply the Security Concepts based on Authentication.</li> <li>6. Appreciate the role of operating system as System software.</li> </ol>
19.	18CAU303	Advanced Networking	<ol style="list-style-type: none"> <li>1. Describe the functions of each layer in OSI and TCP/IP model.</li> <li>2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.</li> <li>3. Describe the Session layer design issues and Transport layer services.</li> <li>4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.</li> <li>5. Describe the functions of data link layer and explain the protocols.</li> <li>6. Explain the types of transmission media with real time applications</li> </ol>
20.	18CAU304A	Android Programming	<ol style="list-style-type: none"> <li>1. Analyze the Architecture and features of Android with another Mobile Operating System.</li> <li>2. Evaluate the standard of Kotlin language for developing Android Applications</li> <li>3. Apply knowledge for creating user Interface and develop activity for Android App.</li> <li>4. Evaluate the user interface architecture of Android for developing Android Apps</li> <li>5. Understand the implementation of SQLite database operations with Android.</li> <li>6. Design and implement Database Application and Content providers.</li> </ol>
21.	18CAU304B	Struts Framework	<ol style="list-style-type: none"> <li>1. Know about MVC and overview of JSP</li> </ol>

			<ol style="list-style-type: none"> <li>2. Identify the components of a Struts Application and how to connect database in web based applications</li> <li>3. Know about the struts Sub elements and Control Tags</li> <li>4. Develop programs with Data Tags and Bean Tags</li> <li>5. Develop programs with HTML Tags and Logic Tags and able to construct enterprise-level web based applications</li> <li>6. Construct web based applications and Identify where data structures are appearing in them.</li> </ol>
22.	18CAU311	Data Structures - Practical	<ol style="list-style-type: none"> <li>1. Implement abstract data types for linear data structures.</li> <li>2. Apply the different linear and non-linear data structures to problem solutions.</li> <li>3. Analyze the applications of tree.</li> <li>4. Implement graph theory over various data structures.</li> <li>5. Critically analyze the various sorting algorithms.</li> <li>6. Able to use linear and non-linear data structures like stacks, queues, linked list etc.</li> </ol>
23.	18CAU312	Operating Systems - Practical	<ol style="list-style-type: none"> <li>1. Design various Scheduling algorithms.</li> <li>2. Apply the principles of concurrency.</li> <li>3. Design deadlock, prevention and avoidance algorithms.</li> <li>4. Compare and contrast various memory management schemes.</li> <li>5. Apply the Security Concepts based on Authentication.</li> <li>6. Appreciate the role of operating system as System software.</li> </ol>
24.	18CAU313	Advanced Networking - Practical	<ol style="list-style-type: none"> <li>1. Describe the functions of each layer in OSI and TCP/IP model.</li> <li>2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.</li> <li>3. Describe the Session layer design issues and Transport layer services.</li> <li>4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.</li> <li>5. Describe the functions of data link layer and explain the protocols.</li> <li>6. Explain the types of transmission media with real time applications</li> </ol>
25.	18CAU314A	Android Programming - Practical	<ol style="list-style-type: none"> <li>1. Analyze the Architecture and features of Android with another Mobile Operating System.</li> <li>2. Evaluate the standard of Kotlin language for developing Android Applications</li> <li>3. Apply knowledge for creating user Interface and develop activity for Android App.</li> <li>4. Evaluate the user interface architecture of Android for developing Android Apps</li> <li>5. Understand the implementation of SQLite database operations with Android.</li> <li>6. Design and implement Database Application and Content providers.</li> </ol>
26.	18CAU314B	Struts Framework- Practical	<ol style="list-style-type: none"> <li>1. Know about MVC and overview of JSP</li> <li>2. Identify the components of a Struts Application and how to connect database in web based applications</li> </ol>

			<ol style="list-style-type: none"> <li>3. Know about the struts Sub elements and Control Tags</li> <li>4. Develop programs with Data Tags and Bean Tags</li> <li>5. Develop programs with HTML Tags and Logic Tags and able to construct enterprise-level web based applications</li> <li>6. Construct web based applications and Identify where data structures are appearing in them.</li> </ol>
27.	18CAU401	Relational Database Management Systems	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the elementary features of RDBMS</li> <li>2. Design conceptual models of a database using ER modelling for real life applications</li> <li>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database</li> <li>4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database</li> <li>5. Design efficient PL/SQL programs to access Oracle databases</li> <li>6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.</li> </ol>
28.	18CAU402	Software Engineering	<ol style="list-style-type: none"> <li>1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.</li> <li>2. Apply systematic procedure for software design and deployment.</li> <li>3. Analyze a problem and identify and define the computing requirements to the problem.</li> <li>4. Formulate appropriate testing strategy for the given software system.</li> <li>5. Develop software projects based on current technology, and test the software using testing tools.</li> <li>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</li> </ol>
29.	18CAU403	Web Programming	<ol style="list-style-type: none"> <li>1. Design web pages.</li> <li>2. Use technologies of Web Programming.</li> <li>3. Apply object-oriented aspects to Scripting.</li> <li>4. Create a basic website using HTML and Cascading Style Sheets.</li> <li>5. Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.</li> <li>6. Use scripting languages and web services to transfer data and add interactive components to web pages</li> </ol>
30.	18CAU404A	R Programming	<ol style="list-style-type: none"> <li>1. Learn how to install and configure software necessary for a statistical programming environment.</li> <li>2. Discuss generic programming language concepts as they are implemented in a high-level statistical language.</li> <li>3. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R</li> </ol>

			<p>functions, debugging, and organizing and commenting R code.</p> <ol style="list-style-type: none"> <li>4. Import external data into R for data processing and statistical analysis</li> <li>5. Learn the main R data structures – vector and data frame</li> <li>6. Learn the file processing in R.</li> </ol>
31.	18CAU404B	Open Source Technologies	<ol style="list-style-type: none"> <li>1. Learned the need of open source technology, open source development model, application of open sources, aspects of open source movement</li> <li>2. The students will be aware about the problems with traditional commercial software.</li> <li>3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.</li> <li>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.</li> <li>5. The students will be familiar with Working of different web Servers.</li> <li>6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID</li> </ol>
32.	18CAU411	Relational Database Management Systems- Practical	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the elementary features of RDBMS</li> <li>2. Design conceptual models of a database using ER modelling for real life applications</li> <li>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database</li> <li>4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database</li> <li>5. Design efficient PL/SQL programs to access Oracle databases</li> <li>6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing</li> </ol>
33.	18CAU412	Software Engineering - Practical	<ol style="list-style-type: none"> <li>1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.</li> <li>2. Apply systematic procedure for software design and deployment.</li> <li>3. Analyze a problem and identify and define the computing requirements to the problem.</li> <li>4. Formulate appropriate testing strategy for the given software system.</li> <li>5. Develop software projects based on current technology, and test the software using testing tools.</li> <li>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.</li> </ol>
34.	18CAU413	Web Programming - Practical	<ol style="list-style-type: none"> <li>1. Design web pages.</li> <li>2. Use technologies of Web Programming.</li> <li>3. Apply object-oriented aspects to Scripting.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Create a basic website using HTML and Cascading Style Sheets.</li> <li>5. Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.</li> <li>6. Use scripting languages and web services to transfer data and add interactive components to web pages.</li> </ol>
35.	18CAU414A	R Programming - Practical	<ol style="list-style-type: none"> <li>1. Learn how to install and configure software necessary for a statistical programming environment.</li> <li>2. Discuss generic programming language concepts as they are implemented in a high-level statistical language.</li> <li>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.</li> <li>4. Import external data into R for data processing and statistical analysis</li> <li>5. Learn the main R data structures – vector and data frame</li> <li>6. Learn the file processing in R</li> </ol>
36.	18CAU414B	Open Source Technologies - Practical	<ol style="list-style-type: none"> <li>1. Learned the need of open source technology, open source development model, application of open sources, aspects of open source movement</li> <li>2. The students will be aware about the problems with traditional commercial software.</li> <li>3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.</li> <li>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.</li> <li>5. The students will be familiar with Working of different web Servers.</li> <li>6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID.</li> </ol>
37.	17CAU501A	Oracle (SQL/PL-SQL )	<ol style="list-style-type: none"> <li>1. Develop efficient PL/SQL programs to access Oracle databases</li> <li>2. Use some of the Oracle supplied PL/SQL packages to generate screen and file outputs</li> <li>3. Design modular applications using packages</li> <li>4. Invoke native dynamic SQL to build runtime SQL statements</li> <li>5. Manage data retrieval with cursors and cursor variables</li> <li>6. Enhance performance using collection datatypes and bulk operations</li> </ol>
38.	17CAU501B	Programming in Python	<ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Structure simple Python programs for solving problems.</li> <li>3. Decompose a Python program into functions.</li> <li>4. Represent compound data using Python lists, tuples, dictionaries.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Read and write data from/to files in Python Programs.</li> <li>6. Implement database and GUI applications</li> </ol>
39.	17CAU502A	Information Security	<ol style="list-style-type: none"> <li>1. State the basic concepts in information security</li> <li>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.</li> <li>3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.</li> <li>4. The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.</li> <li>5. The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.</li> <li>6. The learner will gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath.</li> </ol>
40.	17CAU502B	Data Mining	<ol style="list-style-type: none"> <li>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</li> <li>2. Design and deploy appropriate classification techniques and decision trees.</li> <li>3. Understand the concept of clustering and its real time applications</li> <li>4. Explore recent trends in data mining such as web mining, spatial-temporal mining</li> <li>5. Able to know the basic concepts of data warehouse and OLAP operations</li> <li>6. Organize and Prepare the data needed for data mining using pre pre-processing techniques</li> </ol>
41.	17CAU503A	Microprocessor	<ol style="list-style-type: none"> <li>1. Design and implement programs on 8086, ARM, PIC. CO2 Design I/O circuits.</li> <li>2. The program prepares students to successfully compete for employment in Electronics, Manufacturing and Embedded fields.</li> <li>3. Design Memory Interfacing circuits.</li> <li>4. Design and implement 8051 microcontroller based systems.</li> <li>5. Describe the architecture and instruction set of ARM microcontroller</li> <li>6. Assembly language programming will be studied as well as the design of various types of digital and analog interfaces</li> </ol>
42.	17CAU503B	PC Hardware & Trouble Shooting	<ol style="list-style-type: none"> <li>1. Assemble/setup and upgrade personal computer systems</li> <li>2. Perform installation, configuration,</li> <li>3. Upgrading of hardware and software,</li> <li>4. Install/connect associated peripherals</li> </ol>

			<ol style="list-style-type: none"> <li>5. Diagnose in hardware and software and other peripheral equipment.</li> <li>6. Troubleshoot the problem</li> </ol>
43.	17CAU504A	Digital Image Processing	<ol style="list-style-type: none"> <li>1. Review the fundamental concepts of a digital image processing system.</li> <li>2. Analyze images in the frequency domain using various transforms.</li> <li>3. Evaluate the techniques for image enhancement and image restoration.</li> <li>4. Categorize various compression techniques.</li> <li>5. Interpret Image compression standards.</li> <li>6. Interpret image segmentation and representation techniques.</li> </ol>
44.	17CAU504B	Open Source Technologies	<ol style="list-style-type: none"> <li>1. Leaned the need of open source technology, open source development model, application of open sources, aspects of open source movement</li> <li>2. The students will be aware about the problems with traditional commercial software.</li> <li>3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.</li> <li>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.</li> <li>5. The students will be familiar with Working of different web Servers.</li> <li>6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID</li> </ol>
45.	17CAU511A	Oracle (SQL/PL-SQL ) (Practical)	<ol style="list-style-type: none"> <li>1. Develop efficient PL/SQL programs to access Oracle databases</li> <li>2. Use some of the Oracle supplied PL/SQL packages to generate screen and file outputs</li> <li>3. Design modular applications using packages</li> <li>4. Invoke native dynamic SQL to build runtime SQL statements</li> <li>5. Manage data retrieval with cursors and cursor variables</li> <li>6. Enhance performance using collection datatypes and bulk operations</li> </ol>
46.	17CAU511B	Programming in Python (Practical)	<ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Structure simple Python programs for solving problems.</li> <li>3. Decompose a Python program into functions.</li> <li>4. Represent compound data using Python lists, tuples, dictionaries.</li> <li>5. Read and write data from/to files in Python Programs.</li> <li>6. Implement database and GUI applications</li> </ol>
47.	17CAU512A	Information Security (Practical)	<ol style="list-style-type: none"> <li>1. State the basic concepts in information security</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.</li> <li>4. The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.</li> <li>5. The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.</li> <li>6. The learner will gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath.</li> </ol>
48.	17CAU512B	Data Mining (Practical)	<ol style="list-style-type: none"> <li>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</li> <li>2. Design and deploy appropriate classification techniques and decision trees.</li> <li>3. Understand the concept of clustering and its real time applications</li> <li>4. Explore recent trends in data mining such as web mining, spatial-temporal mining</li> <li>5. Able to know the basic concepts of data warehouse and OLAP operations</li> <li>6. Organize and Prepare the data needed for data mining using pre pre-processing techniques</li> </ol>
49.	17CAU513A	Microprocessor (Practical)	<ol style="list-style-type: none"> <li>1. Design and implement programs on 8086, ARM, PIC. CO2 Design I/O circuits.</li> <li>2. The program prepares students to successfully compete for employment in Electronics, Manufacturing and Embedded fields.</li> <li>3. Design Memory Interfacing circuits.</li> <li>4. Design and implement 8051 microcontroller based systems.</li> <li>5. Describe the architecture and instruction set of ARM microcontroller</li> <li>6. Assembly language programming will be studied as well as the design of various types of digital and analog interfaces</li> </ol>
50.	17CAU513B	PC Hardware & Trouble Shooting (Practical)	<ol style="list-style-type: none"> <li>1. Assemble/setup and upgrade personal computer systems</li> <li>2. perform installation, configuration,</li> <li>3. upgrading of hardware and software,</li> <li>4. install/connect associated peripherals</li> <li>5. diagnose in hardware and software and other peripheral equipment.</li> <li>6. Troubleshoot the problem</li> </ol>
51.	17CAU514A	Digital Image Processing (Practical)	<ol style="list-style-type: none"> <li>1. Review the fundamental concepts of a digital image processing system.</li> <li>2. Analyze images in the frequency domain using various transforms.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Evaluate the techniques for image enhancement and image restoration.</li> <li>4. Categorize various compression techniques.</li> <li>5. Interpret Image compression standards.</li> <li>6. Interpret image segmentation and representation techniques</li> </ol>
52.	17CAU514B	Open Source Technologies (Practical)	<ol style="list-style-type: none"> <li>1. Leaned the need of open source technology, open source development model, application of open sources, aspects of open source movement</li> <li>2. The students will be aware about the problems with traditional commercial software.</li> <li>3. The student will be familiar with basis syntax of PHP, common PHP scripts elements.</li> <li>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.</li> <li>5. The students will be familiar with Working of different web Servers.</li> <li>6. The students will be aware about the software tool and process like Eclipse IDE, Selenium ID</li> </ol>
53.	17CAU601A	PHP Programming	<ol style="list-style-type: none"> <li>1. Write PHP scripts using operators to perform various functions</li> <li>2. Design PHP scripts to handle HTML forms.</li> <li>3. Implement different types of PHP functions.</li> <li>4. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>5. Create PHP scripts using array.</li> <li>6. Analyze and solve various database tasks using the PHP language.</li> </ol>
54.	17CAU601B	Unix / Linux Programming	<ol style="list-style-type: none"> <li>1. Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System</li> <li>2. Demonstrate UNIX commands for file handling and process control</li> <li>3. Write Regular expressions for pattern matching and apply them to various filters for a specific task</li> <li>4. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem</li> <li>5. Implement various file processing commands used in UNIX.</li> <li>6. Construct various shell scripts for simple applications.</li> </ol>
55.	17CAU602A	Cloud Computing	<ol style="list-style-type: none"> <li>1. Define Cloud Computing and memorize the different Cloud service and deployment models</li> <li>2. Describe importance of virtualization along with their technologies.</li> <li>3. Use and Examine different cloud computing services</li> <li>4. Analyze the components of open stack &amp; Google Cloud platform and understand Mobile Cloud Computing</li> <li>5. Describe the key components of Amazon web Service</li> <li>6. Design &amp; develop backup strategies for cloud data based on features</li> </ol>

56.	17CAU602B	Database Administration	<ol style="list-style-type: none"> <li>1. Design, model and install any database management systems by using Oracle database as sample.</li> <li>2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance</li> <li>3. Define and devise transaction management, concurrency control, crash recovery components</li> <li>4. Examine and perform data base administration roles and operations by using Oracle database system as a sample</li> <li>5. Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques.</li> <li>6. Configure, manage and maintain database, to audit and improve database performances and to use tools for database administration.</li> </ol>
57.	17CAU603A	Big Data Analytics	<ol style="list-style-type: none"> <li>1. Work with big data tools and its analysis techniques</li> <li>2. Analyze data by utilizing clustering and classification algorithms</li> <li>3. Learn and apply different mining algorithms and recommendation systems for large volumes of data</li> <li>4. Perform analytics on data streams</li> <li>5. Learn NoSQL databases and management.</li> <li>6. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing</li> </ol>
58.	17CAU603B	System Programming	<ol style="list-style-type: none"> <li>1. Organize the functionalities &amp; components of system software &amp; tools into different layers for efficient code generation.</li> <li>2. Apply the knowledge &amp; technique to develop solutions to real world problems by compiling application programs.</li> <li>3. Ability to identify, formulate, and solve computer engineering problems with proper systematic &amp; semantic approach.</li> <li>4. Develop possible program constructs for further code generation with Type checking &amp; memory management strategy</li> <li>5. Design a simple compiler with tools &amp; different with optimized techniques</li> <li>6. Design and implement system utility programs.</li> </ol>
59.	17CAU611A	PHP Programming (Practical)	<ol style="list-style-type: none"> <li>1. Write PHP scripts using operators to perform various functions</li> <li>2. Design PHP scripts to handle HTML forms.</li> <li>3. Implement different types of PHP functions.</li> <li>4. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>5. Create PHP scripts using array.</li> <li>6. Analyze and solve various database tasks using the PHP language.</li> </ol>
60.	17CAU611B	Unix / Linux Programming (Practical)	<ol style="list-style-type: none"> <li>1. Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System</li> </ol>

			<ol style="list-style-type: none"> <li>2. Demonstrate UNIX commands for file handling and process control</li> <li>3. Write Regular expressions for pattern matching and apply them to various filters for a specific task</li> <li>4. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem</li> <li>5. Implement various file processing commands used in UNIX.</li> <li>6. Construct various shell scripts for simple applications.</li> </ol>
61.	17CAU612A	Cloud Computing (Practical)	<ol style="list-style-type: none"> <li>1. Define Cloud Computing and memorize the different Cloud service and deployment models</li> <li>2. Describe importance of virtualization along with their technologies.</li> <li>3. Use and Examine different cloud computing services</li> <li>4. Analyze the components of open stack &amp; Google Cloud platform and understand Mobile Cloud Computing</li> <li>5. Describe the key components of Amazon web Service</li> <li>6. Design &amp; develop backup strategies for cloud data based on features</li> </ol>
62.	17CAU612B	Database Administration (Practical)	<ol style="list-style-type: none"> <li>1. Design, model and install any database management systems by using Oracle database as sample.</li> <li>2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance</li> <li>3. Define and devise transaction management, concurrency control, crash recovery components</li> <li>4. Examine and perform data base administration roles and operations by using Oracle database system as a sample</li> <li>5. Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques.</li> <li>6. Configure, manage and maintain database, to audit and improve database performances and to use tools for database administration.</li> </ol>
63.	17CAU613A /	Big Data Analytics (Practical) /	<ol style="list-style-type: none"> <li>1. Work with big data tools and its analysis techniques</li> <li>2. Analyze data by utilizing clustering and classification algorithms</li> <li>3. Learn and apply different mining algorithms and recommendation systems for large volumes of data</li> <li>4. Perform analytics on data streams</li> <li>5. Learn NoSQL databases and management.</li> <li>6. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing</li> </ol>
64.	17CAU613B	System Programming (Practical)	<ol style="list-style-type: none"> <li>1. Organize the functionalities &amp; components of system software &amp; tools into different layers for efficient code generation.</li> <li>2. Apply the knowledge &amp; technique to develop solutions to real world problems by compiling application programs.</li> </ol>

			<ol style="list-style-type: none"><li>3. ability to identify, formulate, and solve computer engineering problems with proper systematic &amp; semantic approach.</li><li>4. Develop possible program constructs for further code generation with Type checking &amp; memory management strategy</li><li>5. Design a simple compiler with tools &amp; different with optimized techniques</li><li>6. Design and implement system utility programs.</li></ol>
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Name of the Department: **Computer Applications**

**Course: MCA**

<b>Sl. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Course Outcomes</b>
1.	18CAP301	Database Management Systems	<ol style="list-style-type: none"><li>1. Define the terminology, features, classifications, and characteristics embodied in database systems.</li><li>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.</li><li>3. Demonstrate an understanding of the relational data model.</li><li>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.</li><li>5. Formulate, using relational algebra, solutions to a broad range of query problems.</li><li>6. Perform Database backup and recovery from catastrophic failure</li></ol>
2.	18CAP302	Computer Networks	<ol style="list-style-type: none"><li>1. To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.</li><li>2. To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks,</li><li>3. To be familiar with wireless networking concepts,</li><li>4. To be familiar with contemporary issues in networking technologies</li><li>5. To understand the functionalities needed for data communication into layers</li><li>6. To know the various security methodology in network</li></ol>
3.	18CAP303	Advanced Java and Springs	<ol style="list-style-type: none"><li>1. Able to implement, compile, test and run Java program,</li><li>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</li><li>3. Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets</li><li>4. Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.</li><li>5. Write code with spring framework components.</li><li>6. Use collection such as list, set, map in java programming</li></ol>

4.	18CAP304	Statistical Computing	<ol style="list-style-type: none"> <li>1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.</li> <li>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.</li> <li>3. Communicate effectively in a variety of professional contexts.</li> <li>4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.</li> <li>5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.</li> <li>6. Apply computer science theory and software development fundamentals to produce computing-based solutions.</li> </ol>
5.	18CAP305	Management Support Systems	<ol style="list-style-type: none"> <li>1. Discuss today's turbulent business environment and describe how organizations survive and even excel in such an environment.</li> <li>2. Discuss the need for computerized support of managerial decision making.</li> <li>3. Describe the conceptual foundation of the decision support system (DSS)</li> <li>4. Describe the business intelligence (BI) methodology and relate them each other.</li> <li>5. List the major tools of computerized decision support and major issues in implementing computerized decision support systems.</li> <li>6. Define the conceptual foundations of decision making.</li> </ol>
6.	18CAP311	Database Management Systems- Practical	<ol style="list-style-type: none"> <li>1. Define the terminology, features, classifications, and characteristics embodied in database systems.</li> <li>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.</li> <li>3. Demonstrate an understanding of the relational data model.</li> <li>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.</li> <li>5. Formulate, using relational algebra, solutions to a broad range of query problems.</li> <li>6. Perform Database backup and recovery from catastrophic failure</li> </ol>
7.	18CAP312	Computer Network - Practical	<ol style="list-style-type: none"> <li>1. To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.</li> </ol>

			<ol style="list-style-type: none"> <li>2. To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks,</li> <li>3. To be familiar with wireless networking concepts,</li> <li>4. To be familiar with contemporary issues in networking technologies</li> <li>5. To understand the functionalities needed for data communication into layers</li> <li>6. To know the various security methodology in network</li> </ol>
8.	18CAP313	Advanced Java and Springs- Practical	<ol style="list-style-type: none"> <li>1. Able to implement, compile, test and run Java program,</li> <li>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</li> <li>3. Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets</li> <li>4. Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.</li> <li>5. Write code with spring framework components.</li> <li>6. Use collection such as list, set, map in java programming</li> </ol>
9.	18CAP401	J2EE	<ol style="list-style-type: none"> <li>1. Characterize the concepts J2SE and J2EE</li> <li>2. Develop Enterprise Applications using Session Bean, Entity Bean and MDB</li> <li>3. Demonstrate the hierarchy of Java classes to provide software solutions using Java APIs</li> <li>4. Analyze the components and patterns of Java Servlet architecture for web applications</li> <li>5. Apply systematic Java programming knowledge to connect backend and front end</li> <li>6. Implement the Java Servlet to transfer data</li> </ol>
10.	18CAP402	Mobile Computing	<ol style="list-style-type: none"> <li>1. Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.</li> <li>2. Analyze the architectures and the challenges of Wireless Networks.</li> <li>3. Analyze the role of Wireless Protocols in Wireless Networks.</li> <li>4. Know about different types of Wireless Communication Networks and their functionalities.</li> <li>5. Develop Mobile Applications Using Android</li> <li>6. Identify the features involved in Bluetooth technology.</li> </ol>
11.	18CAP403	Organizational Behaviour	<ol style="list-style-type: none"> <li>1. Analyze individual and group behaviour, and understand the implications of organizational behaviour on the process of management.</li> <li>2. Identify different motivational theories and evaluate motivational strategies used in a variety of organizational settings.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Evaluate the appropriateness of various leadership styles and conflict management strategies used in organizations.</li> <li>4. Describe and assess the basic design elements of organizational structure</li> <li>5. Evaluate their impact on employees.</li> <li>6. Explain how organizational change and culture affect working relationships within organizations.</li> </ol>
12.	18CAP404D/	Database Administration	<ol style="list-style-type: none"> <li>1. Design, model and install any database management systems by using Oracle database as sample.</li> <li>2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance</li> <li>3. Define and devise transaction management, concurrency control, crash recovery components</li> <li>4. Examine and perform data base administration roles</li> <li>5. Examine the database operations by using Oracle database system as a sample.</li> <li>6. Apply the knowledge of VLDB to control the distributed databases</li> </ol>
13.	18CAP404N/	Cryptography And Network Security/	<ol style="list-style-type: none"> <li>1. Classify the symmetric encryption techniques</li> <li>2. Illustrate various Public key cryptographic techniques</li> <li>3. Evaluate the authentication and hash algorithms.</li> <li>4. Summarize the intrusion detection and its solutions to overcome the attacks.</li> <li>5. Demonstrate the basic concepts of system level security</li> <li>6. Apply the block chain technology for security</li> </ol>
14.	18CAP404S/	Software Testing	<ol style="list-style-type: none"> <li>1. Test the software by applying testing techniques to deliver a product free from bugs</li> <li>2. Evaluate the web applications using bug tracking tools.</li> <li>3. Investigate the scenario and the able to select the proper testing technique</li> <li>4. Explore the test automation concepts and tools</li> <li>5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma</li> <li>6. Evaluate the estimation of cost, schedule based on standard metrics</li> </ol>
15.	18CAP404W/	XML	<ol style="list-style-type: none"> <li>1. Learn the basics of creating XML documents, transforming XML documents, and validating XML documents.</li> <li>2. More specifically, you will learn the basics and history of XML and how to write your own XML documents.</li> <li>3. Learn how to transform XML documents into documents of other types using XSLT.</li> <li>4. Learn how to write valid XML documents based on a DTD.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Combine XML with existing web technologies.</li> <li>6. Implement using XML Path language</li> </ol>
16.	18CAP404B	Managerial Economics	<ol style="list-style-type: none"> <li>1. Understand the roles of managers in firms</li> <li>2. Understand the internal and external decisions to be made by managers</li> <li>3. Analyze the demand and supply conditions and assess the position of a company</li> <li>4. Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.</li> <li>5. Analyze real-world business problems with a systematic theoretical framework.</li> <li>6. Maintain product and cost analysis</li> </ol>
17.	18CAP405D	Distributed Database Management System	<ol style="list-style-type: none"> <li>1. The physical structure of the database to handle data</li> <li>2. Students would be able to implement the logic by using tools like ERD</li> <li>3. Ability to normalize the database &amp; understand the internal data structure</li> <li>4. Students would clearly understand the transaction system</li> <li>5. Extract the data efficiently</li> <li>6. Detect or Avoid deadlock using the deadlock handling method</li> </ol>
18.	18CAP405N	TCP/IP	<ol style="list-style-type: none"> <li>1. Configure subnets using IP classes B and C</li> <li>2. Explain TCP/IP protocols, ports, sockets, and data encapsulation</li> <li>3. Describe the process of packet fragmentation and reassembly</li> <li>4. Explain the key features and functions of TCP and UDP</li> <li>5. Use Wireshark to identify ICMP request and reply packets</li> <li>6. Know the operation of DHCP</li> </ol>
19.	18CAP405S	Object Oriented Analysis and Design with UML	<ol style="list-style-type: none"> <li>1. Understand of programming language concepts;</li> <li>2. Demonstrate the software engineering principles</li> <li>3. Apply the principles of software engineering to software design;</li> <li>4. Apply the knowledge of OOAD to complete large software project</li> <li>5. Analyze the deployment of UML diagrams for software design</li> <li>6. Apply the principles of software engineering quality principles for developing quality software</li> </ol>
20.	18CAP405W	Web Services	<ol style="list-style-type: none"> <li>1. Understand the use of web services in B2C and B2B applications.</li> <li>2. Understand the design principles and application of SOAP</li> <li>3. To know the principles of REST based web services.</li> <li>4. Design collaborating web services according to a specification.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Implement an application that uses multiple web services in a realistic business scenario.</li> <li>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.</li> </ol>
21.	18CAP405B	Corporate Planning	<ol style="list-style-type: none"> <li>1. Understand the strategic decisions that organizations make and have an ability to engage in strategic planning.</li> <li>2. Explain the basic concepts, principles and practices associated with strategy formulation and implementation.</li> <li>3. Integrate and apply knowledge gained in basic courses to the formulation and implementation of strategy from holistic and multi-functional perspectives.</li> <li>4. Analyze and evaluate critically real life company situations</li> <li>5. Develop creative solutions, using a strategic management perspective.</li> <li>6. Conduct and present a credible business analysis in a team setting.</li> </ol>
22.	18CAP411	J2EE - Practical	<ol style="list-style-type: none"> <li>1. Characterize the concepts J2SE and J2EE</li> <li>2. Develop Enterprise Applications using Session Bean, Entity Bean and MDB</li> <li>3. Demonstrate the hierarchy of Java classes to provide software solutions using Java APIs</li> <li>4. Analyze the components and patterns of Java Servlet architecture for web applications</li> <li>5. Apply systematic Java programming knowledge to connect backend and front end</li> <li>6. Implement the Java Servlet to transfer data</li> </ol>
23.	18CAP412	Mobile Computing - Practical	<ol style="list-style-type: none"> <li>1. Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.</li> <li>2. Analyze the architectures and the challenges of Wireless Networks.</li> <li>3. Analyze the role of Wireless Protocols in Wireless Networks.</li> <li>4. Know about different types of Wireless Communication Networks and their functionalities.</li> <li>5. Develop Mobile Applications Using Android</li> <li>6. Identify the features involved in Bluetooth technology.</li> </ol>
24.	18CAP413D	DBA – Practical	<ol style="list-style-type: none"> <li>1. Design, model and install any database management systems by using Oracle database as sample.</li> <li>2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance</li> <li>3. Define and devise transaction management, concurrency control, crash recovery components</li> </ol>

			<ol style="list-style-type: none"> <li>4. Examine and perform data base administration roles</li> <li>5. Examine the database operations by using Oracle database system as a sample.</li> <li>6. Apply the knowledge of VLDB to control the distributed databases</li> </ol>
25.	18CAP413N	Network security - Practical	<ol style="list-style-type: none"> <li>1. Classify the symmetric encryption techniques</li> <li>2. Illustrate various Public key cryptographic techniques</li> <li>3. Evaluate the authentication and hash algorithms.</li> <li>4. Summarize the intrusion detection and its solutions to overcome the attacks.</li> <li>5. Demonstrate the basic concepts of system level security</li> <li>6. Apply the block chain technology for security</li> </ol>
26.	18CAP413S	Software Testing – Practical	<ol style="list-style-type: none"> <li>1. Test the software by applying testing techniques to deliver a product free from bugs</li> <li>2. Evaluate the web applications using bug tracking tools.</li> <li>3. Investigate the scenario and the able to select the proper testing technique</li> <li>4. Explore the test automation concepts and tools</li> <li>5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma</li> <li>6. Evaluate the estimation of cost, schedule based on standard metrics</li> </ol>
27.	18CAP413W	XML – Practical	<ol style="list-style-type: none"> <li>1. Learn the basics of creating XML documents, transforming XML documents, and validating XML documents.</li> <li>2. More specifically, you will learn the basics and history of XML and how to write your own XML documents.</li> <li>3. Learn how to transform XML documents into documents of other types using XSLT.</li> <li>4. Learn how to write valid XML documents based on a DTD.</li> <li>5. Combine XML with existing web technologies.</li> <li>6. Implement using XML Path language</li> </ol>
28.	18CAP413B	WAP - Practical	<ol style="list-style-type: none"> <li>1. Able to understand the infrastructure to develop mobile communication systems</li> <li>2. Able to characterize of different multiple access techniques in mobile communication.</li> <li>3. Know about NS2 script</li> <li>4. Simulate the network traffic and routing</li> <li>5. Measure the performance</li> <li>6. Demonstrate the OSPF routing</li> </ol>
29.	17CAP501	PHP5/ MySQL	<ol style="list-style-type: none"> <li>1. Implement regular expressions in PHP programming including modifiers, operators, and meta characters.</li> <li>2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</li> <li>3. Analyze and solve various database tasks using the PHP language.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Create server side web applications using PHP and MySQL.</li> <li>5. Analyze the structure of an E-Mail message.</li> <li>6. Develop the files and directories management operation.</li> </ol>
30.	17CAP502	.Net Programming	<ol style="list-style-type: none"> <li>1. Develop Windows based applications using Visual Basic.Net</li> <li>2. Implement ADO.Net concept in VB.Net and ASP.Net applications</li> <li>3. Create server side web applications using ASP.NET</li> <li>4. Analyze the concept of data sources and data bound controls in VB.NET and ASP.NET</li> <li>5. Demonstrate the working of ADO.Net controls for developing ASP.Net web applications</li> <li>6. Design the application using ASP.NET Web Server Control</li> </ol>
31.	17CAP503	Optimization Techniques	<ol style="list-style-type: none"> <li>1. Formulate a real-world problem as a mathematical programming model.</li> <li>2. Understand the theoretical workings of the simple method for linear programming and perform iterations of it by hand.</li> <li>3. Understand the relationship between a linear program and its dual, including strong duality and complementary slackness</li> <li>4. Understand the importance of optimization techniques in industrial process management</li> <li>5. Understand the concept of Inventory theory in solving industry based optimization problems</li> <li>6. Estimate the time and cost for the process</li> </ol>
32.	17CAP504N	Network Architecture And Management	<ol style="list-style-type: none"> <li>1. To solve the problems in computer network system management</li> <li>2. To analyze the challenges in the implementation of ATM networks</li> <li>3. To implement SNMP Model in the management of computer networks</li> <li>4. To configure routers using computer network software tools</li> <li>5. To implement service level agreement in Computer Network management systems</li> <li>6. To know the Network Management Tools and Systems</li> </ol>
33.	17CAP504S	Software Project Management	<ol style="list-style-type: none"> <li>1. Implement the concept of software effort estimation in developing software project.</li> <li>2. Develop a responsible attitude towards the use of computer as well as the technology.</li> <li>3. Evaluate the risks during the development of software projects</li> <li>4. Understand the organization behaviour in software project management.</li> <li>5. Implement team management process in developing quality software</li> <li>6. Monitor the software project management in various ways such as cost control, performance control, etc.,</li> </ol>

34.	17CAP504W	Angular JS	<ol style="list-style-type: none"> <li>1. To apply an AngularJS Single Page Application from scratch</li> <li>2. To build an awesome User Interface</li> <li>3. To create and bind controllers with JavaScript</li> <li>4. To separate the model, view, and controller layers of your application and implement them using AngularJS</li> <li>5. To integrate and enhance Angular applications with other useful JavaScript libraries such as Node.js</li> <li>6. Test the application using AngularJS</li> </ol>
35.	17CAP504B	MIS Framework	<ol style="list-style-type: none"> <li>1. Analyze the major technological, organizational, behavioural, and ethical issues facing today's information systems professional.</li> <li>2. Implement IT strategy in managing the information system of any organization.</li> <li>3. Analyze the emerging technologies</li> <li>4. Impact of emerging technologies on corporate performance.</li> <li>5. Implement the principles of Business Process Engineering in improving the business of any organization</li> <li>6. Analyze the critical success factors in implementing IT applications</li> </ol>
36.	17CAP504D	Data Mining and Data Warehousing	<ol style="list-style-type: none"> <li>1. To understand the data mining process of voluminous data using OLAP</li> <li>2. To implement the pre-processing concept in data mining applications</li> <li>3. To apply the data mining algorithms on big data to extract useful data</li> <li>4. To implement data mining techniques for complex data types</li> <li>5. To implement Decision Support System concept in data mining for developing intelligence business applications</li> <li>6. To apply the web data mining</li> </ol>
37.	17CAP505N	Distributed Computing	<ol style="list-style-type: none"> <li>1. To develop and apply knowledge of parallel and distributed computing techniques and methodologies.</li> <li>2. To Apply design, development, and performance analysis on parallel and distributed applications</li> <li>3. To implement the application of fundamental Computer Science methods</li> <li>4. To implement the algorithms in the development of parallel applications.</li> <li>5. Implement distributed shared memory concepts in distributed computing.</li> <li>6. To apply Authentication methods in distributed application</li> </ol>
38.	17CAP505S	Software Metrics	<ol style="list-style-type: none"> <li>1. To analyze the importance of modelling and modelling languages</li> <li>2. To apply the basic quality tools in software development</li> <li>3. Analyze the software process metrics in the process of software testing</li> </ol>

			<ol style="list-style-type: none"> <li>4. Implement function point metrics to measure software process improvement</li> <li>5. Explain the business requirements pertaining to software development</li> <li>6. Assess the software project using the metrics</li> </ol>
39.	17CAP505W	Semantic Web	<ol style="list-style-type: none"> <li>1. Analyze fundamental concepts, advantages and limits of the semantic web</li> <li>2. Implement ontologies in the context of developing semantic web</li> <li>3. Implement RDF framework and associated technologies for developing semantic web</li> <li>4. Implement semantic Web Tools like Jena and SPARL for developing architecture for semantic web</li> <li>5. Analyze the social network data</li> <li>6. Implement the problem using the web ontology language</li> </ol>
40.	17CAP505B	Taxation Practices	<ol style="list-style-type: none"> <li>1. Analyze the procedures in Assessing firms and associations</li> <li>2. Analyze the need for assessing the undivided families</li> <li>3. Apply the advance payment procedures in the taxation practices</li> <li>4. Apply the procedure for registration and cancellation in central sales taxation</li> <li>5. Learn various components related to the theme of tax liability determination</li> <li>6. Analyze the wealth tax</li> </ol>
41.	17CAP505D	Big Data Analytics	<ol style="list-style-type: none"> <li>1. Analyze the big data analytic techniques for useful business applications.</li> <li>2. Implement the concept of virtualization and abstraction in analyzing big data</li> <li>3. Analyze the HADOOP and Map Reduce technologies associated with big data analytics</li> <li>4. Understand the fundamentals of various bigdata analysis techniques</li> <li>5. Implement the integration of data sources in operationalizing Big Data</li> <li>6. Implement the text analytics using Hadoop</li> </ol>
42.	17CAP511	PHP5/ MySQL - Practical	<ol style="list-style-type: none"> <li>1. Implement regular expressions in PHP programming including modifiers, operators, and meta characters.</li> <li>2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</li> <li>3. Analyze and solve various database tasks using the PHP language.</li> <li>4. Create server side web applications using PHP and MySQL.</li> <li>5. Analyze the structure of an E-Mail message</li> <li>6. Develop the files and directories management operation</li> </ol>
43.	17CAP512	.Net Programming - Practical	<ol style="list-style-type: none"> <li>1. Develop Windows based applications using Visual Basic.Net</li> </ol>

			<ol style="list-style-type: none"> <li>2. Implement ADO.Net concept in VB.Net and ASP.Net applications</li> <li>3. Create server side web applications using ASP.NET</li> <li>4. Analyze the concept of data sources and data bound controls in VB.NET and ASP.NET</li> <li>5. Demonstrate the working of ADO.Net controls for developing ASP.Net web applications</li> <li>6. Design the application using ASP.NET Web Server Control</li> </ol>
44.	17CAP513N	Network Simulator - Practical	<ol style="list-style-type: none"> <li>1. To solve the problems in computer network system management</li> <li>2. To analyze the challenges in the implementation of ATM networks</li> <li>3. To implement SNMP Model in the management of computer networks</li> <li>4. To configure routers using computer network software tools</li> <li>5. To implement service level agreement in Computer Network management systems</li> <li>6. To know the Network Management Tools and Systems</li> </ol>
45.	17CAP513S	Software Development - Practical Using Moodle	<ol style="list-style-type: none"> <li>1. Implement the concept of software effort estimation in developing software project.</li> <li>2. Develop a responsible attitude towards the use of computer as well as the technology.</li> <li>3. Evaluate the risks during the development of software projects</li> <li>4. Understand the organization behaviour in software project management.</li> <li>5. Implement team management process in developing quality software</li> <li>6. Monitor the software project management in various ways such as cost control, performance control, etc.,</li> </ol>
46.	17CAP513W	Angular JS -Practical	<ol style="list-style-type: none"> <li>1. To apply an AngularJS Single Page Application from scratch</li> <li>2. To build an awesome User Interface</li> <li>3. To create and bind controllers with JavaScript</li> <li>4. To separate the model, view, and controller layers of your application and implement them using AngularJS</li> <li>5. To integrate and enhance Angular applications with other useful JavaScript libraries such as Node.js</li> <li>6. Test the application using AngularJS</li> </ol>
47.	17CAP513B	MIS -Practical	<ol style="list-style-type: none"> <li>1. Discuss today's turbulent business environment and describe how organizations survive and even excel in such an environment.</li> <li>2. Discuss the need for computerized support of managerial decision making.</li> <li>3. Describe the conceptual foundation of the decision support system (DSS)</li> <li>4. Describe the business intelligence (BI) methodology and relate them each other.</li> </ol>

			<ol style="list-style-type: none"> <li>5. List the major tools of computerized decision support and major issues in implementing computerized decision support systems.</li> <li>6. Define the conceptual foundations of decision making.</li> </ol>
48.	17CAP513D	Data Mining - Practical	<ol style="list-style-type: none"> <li>1. To understand the data mining process of voluminous data using OLAP</li> <li>2. To implement the pre-processing concept in data mining applications</li> <li>3. To apply the data mining algorithms on big data to extract useful data</li> <li>4. To implement data mining techniques for complex data types</li> <li>5. To implement Decision Support System concept in data mining for developing intelligence business applications</li> <li>6. To apply the web data mining</li> </ol>

Name of the Department: **Computer Science**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LSU101	Language –I	<ol style="list-style-type: none"><li>1. இந்தியகுடியுரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்</li><li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய</li><li>3. ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>4. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல்தமிழ்' 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li><li>5. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li><li>6. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக</li><li>7. இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி</li><li>8. மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li></ol>
2.	19CGU101	Programming Fundamentals using C / C++	<ol style="list-style-type: none"><li>1. Develop programs using the basic elements like control statements, Arrays and Strings.</li><li>2. understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li><li>3. Understand about the code reusability with the help of user defined functions.</li><li>4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</li><li>5. Use the characteristics of an object-oriented programming language in a program.</li><li>6. Use the basic object-oriented design principles in computer problem solving.</li></ol>
3.	19CGU102	Operating Systems	<ol style="list-style-type: none"><li>1. Ability to work in Windows 7 operating system, its tools and utilities.</li><li>2. Install and configure Windows 2012 server and client.</li><li>3. Use administrative tools and backup management for Windows 2012 server.</li><li>4. Understand device and Process management and techniques in Windows environment.</li><li>5. Monitor server OS of Windows</li><li>6. Create group policy in Windows 2012.</li></ol>
4.	19CGU103	Computer Fundamentals	<ol style="list-style-type: none"><li>1. Understand the meaning and basic components of a computer system,</li><li>2. Gain knowledge about five generations and classification of computer system,</li><li>3. Explain the functions of a computer,</li></ol>

			<ol style="list-style-type: none"> <li>4. Identify and discuss the functional units of a computer system,</li> <li>5. Identify the various input and output units and explain their purposes</li> <li>6. Understand the emerging technologies and their uses.</li> </ol>
5.	19CGU111	Programming Fundamentals using C / C++ - Practical	<ol style="list-style-type: none"> <li>1. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>2. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory.</li> <li>3. Understand about the code reusability with the help of user defined functions.</li> <li>4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</li> <li>5. Use the characteristics of an object-oriented programming language in a program.</li> <li>6. Use the basic object-oriented design principles in computer problem solving.</li> </ol>
6.	19CGU112	Operating Systems – Practical	<ol style="list-style-type: none"> <li>1. Ability to work in Windows 7 operating system, its tools and utilities.</li> <li>2. Install and configure Windows 2012 server and client.</li> <li>3. Use administrative tools and backup management for Windows 2012 server.</li> <li>4. Understand device and Process management and techniques in Windows environment.</li> <li>5. Monitor server OS of Windows</li> <li>6. Create group policy in Windows 2012.</li> </ol>
7.	19CGU113	Problem solving using worksheets – Practical	<ol style="list-style-type: none"> <li>1. Create and design a spreadsheet for general office use.</li> <li>2. Demonstrate the basic mechanics and navigation of an Excel spreadsheet.</li> <li>3. Demonstrate the use of basic functions and formulas</li> <li>4. Create applications using VBA code in Excel</li> <li>5. Ability to develop macros.</li> <li>6. Creating interactive worksheets</li> </ol>
8.	19AEC101	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
9.	19LSU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்தியகுடியரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற தமிழ்</li> </ol>

			<p>இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்</p> <p>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய</p> <p>3. ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</p> <p>4. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல்தமிழ்' 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</p> <p>5. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</p> <p>6. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக</p> <p>7. இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி</p> <p>8. மொழிபெயர்ப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
10.	19ENU201	English	<p>1. Develop the knowledge of interpersonal skills.</p> <p>2. Establish and maintain social relationships.</p> <p>3. Genres of literature will give moral values of life.</p> <p>4. Develop communication skills in business environment</p> <p>5. Communication skills will get developed.</p> <p>6. Develop to have language competence.</p>
11.	19CGU201	Computer Networks	<p>1. Understand the functions of each layer in OSI and TCP/IP model.</p> <p>2. Explain the multiplexing, switching concept and types of transmission media with real time examples.</p> <p>3. Understand the error detection and correction methods and can implement the data link layer protocols</p> <p>4. Understand channel error detection and correction, MAC protocols, Ethernet and WLAN.</p> <p>5. Learn different medium access method to avoid collision and to learn about routing table.</p> <p>6. Learn basic functionalities of transport layer and application layer.</p>
12.	19CGU202	Discrete Structures	<p>1. Familiar with elementary algebraic set theory.</p> <p>2. Acquire a fundamental understanding of the core concepts in growth of functions.</p> <p>3. Describe the method of recurrence relations.</p> <p>4. Get wide knowledge about graphs and trees</p> <p>5. Initiate to knowledge from inference theory</p> <p>6. Solve problems with the help of tools of mathematical analysis.</p>
13.	19CGU203	Information Technology Information Library	<p>1. Design a knowledge-based system.</p> <p>2. Understand service lifecycle model</p> <p>3. Know the key principles models and concepts of service management</p> <p>4. Understand the process management and risk management</p> <p>5. Know the challenges in providing IT infrastructure services</p>

			6. Understand the event management concepts.
14.	19CGU211	Computer Networks – Practical	<ol style="list-style-type: none"> <li>1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.</li> <li>2. Understand IP Addressing Fundamentals</li> <li>3. Understand IPv4 forwarding and routing.</li> <li>4. Learn about host name resolution and the Domain Name System (DNS).</li> <li>5. Learn about services and operations of DHCP Servers and Domain Name Servers</li> <li>6. To compare and contrast IP routing protocols</li> </ol>
15.	19CGU212	Discrete Structures – Practical	<ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Acquire a fundamental understanding of the core concepts in growth of functions.</li> <li>3. Describe the method of recurrence relations.</li> <li>4. Get wide knowledge about graphs and trees</li> <li>5. Initiate to knowledge from inference theory</li> <li>6. Solve problems with the help of tools of mathematical analysis.</li> </ol>
16.	19CGU213	Web Technologies - Practical	<ol style="list-style-type: none"> <li>1. Analyze a web page and identify its elements and attributes.</li> <li>2. Create a HTML page with formatting text tags, tables and lists.</li> <li>3. Creating a HTML file with Frames.</li> <li>4. Create web pages using XHTML and Cascading Styles sheets.</li> <li>5. Build dynamic web pages using JavaScript (client-side programming).</li> <li>6. Create XML documents.</li> </ol>

Name of the Department: **Computer Science**

**Course:** B.Sc. Computer Science

Sl. No	Course Code	Name of the Course	Course Outcomes
1.	17CSU501 A	Information Security	<p>A student who successfully completes this course should at a minimum be able to:</p> <ol style="list-style-type: none"><li>1. Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms</li><li>2. State the basic concepts in information security</li><li>3. Explain concepts related to applied cryptography including the techniques for crypto-analysis symmetric and asymmetric cryptography.</li><li>4. Use digital signature, message authentication code, hash functions and modes of encryption operations.</li><li>5. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.</li><li>6. Understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications</li></ol>
2.	17CSU501 B	Network Programming	<p>Having successfully completed this course, the student will be able to:</p> <ol style="list-style-type: none"><li>1. Understand the fundamental concepts of networks</li><li>2. Demonstrate mastery of main protocols comprising the Internet.</li><li>3. Develop skills in network programming techniques.</li><li>4. Implement network services that communicate through the Internet.</li><li>5. Apply the client-server model in networking applications.</li><li>6. Practice networking commands available through the operating systems</li></ol>
3.	17CSU502 A	Microprocessor	<ol style="list-style-type: none"><li>1. Apply the fundamentals of assembly level programming of microprocessors.</li><li>2. Build a program on a microprocessor using arithmetic &amp; logical instruction set of 8086.</li><li>3. Develop the assembly level programming using 8086 loop instruction set.</li><li>4. Write programs based on string and procedure for 8086 microprocessor.</li><li>5. Analyze abstract problems and apply a combination of hardware and software to address the problem</li><li>6. Make use of standard test and measurement equipment to evaluate digital interfaces</li></ol>
4.	17CSU502 B	Digital Image Processing	<ol style="list-style-type: none"><li>1. Remember the fundamental concepts of image processing.</li><li>2. Explain different Image enhancement techniques</li><li>3. Understand and review image transforms</li><li>4. Analyze the basic algorithms used for image processing &amp; image compression with morphological image processing.</li><li>5. Contrast Image Segmentation and Representation</li></ol>

			6. Design & Synthesize color image processing and its real world applications
5.	17CSU503 A	Machine Learning	<ol style="list-style-type: none"> <li>1. Remember the basic concepts and techniques of Machine Learning.</li> <li>2. Develop skills of using recent machine learning software for solving practical problems.</li> <li>3. of doing independent study and research.</li> <li>4. To recognize the characteristics of machine learning that make it useful to real-world problems.</li> <li>5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.</li> <li>6. To effectively use machine learning toolboxes.</li> </ol>
6.	17CSU503 B	Introduction to Data Sciences	<ol style="list-style-type: none"> <li>1. Install and use R for simple programming tasks.</li> <li>2. Extend the functionality of R by using add-on packages</li> <li>3. Extract data from files and other sources and perform various data manipulation tasks on them.</li> <li>4. Code statistical functions in R.</li> <li>5. Use R Graphics and Tables to visualize results of various statistical operations on data.</li> <li>6. Apply the knowledge of R gained to data Analytics for real life applications.</li> </ol>
7.	17CSU504 A	Oracle (SQL/PL-SQL)	<ol style="list-style-type: none"> <li>1. Understand the ORACLE software for developing databases and using them.</li> <li>2. Using the SQL *plus interface and its commands.</li> <li>3. creating, altering tables, views, indexes ,synonyms and constraints using DDL statements.</li> <li>4. Querying the database using DML statements and write complex queries for information retrieval.</li> <li>5. Apply transaction controls statements in Oracle</li> <li>6. Write procedures and functions using PL/SQL.</li> </ol>
8.	17CSU504 B	Programming in Python	<p>Upon completion of this the course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Structure simple Python programs for solving problems.</li> <li>3. Learn to use logical constructs in Python</li> <li>4. Decompose a Python program into functions.</li> <li>5. Represent compound data using Python lists, tuples, dictionaries.</li> <li>6. Read and write data from/to files in Python Programs.</li> </ol>
9.	17CSU511 A	Information Security – Practical	<p>A student who successfully completes this course should at a minimum be able to:</p> <ol style="list-style-type: none"> <li>1. Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms</li> <li>2. State the basic concepts in information security</li> <li>3. Explain concepts related to applied cryptography including the techniques for crypto-analysis symmetric and asymmetric cryptography.</li> <li>4. Use digital signature, message authentication code, hash functions and modes of encryption operations.</li> <li>5. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.</li> </ol>

			6. Understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications
10.	17CSU511 B	Network Programming – Practical	Having successfully completed this course, the student will be able to: <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of networks</li> <li>2. Demonstrate mastery of main protocols comprising the Internet.</li> <li>3. Develop skills in network programming techniques.</li> <li>4. Implement network services that communicate through the Internet.</li> <li>5. Apply the client-server model in networking applications.</li> <li>6. Practice networking commands available through the operating systems</li> </ol>
11.	17CSU512 A	Microprocessor – Practical	<ol style="list-style-type: none"> <li>1. Apply the fundamentals of assembly level programming of microprocessors.</li> <li>2. Build a program on a microprocessor using arithmetic &amp; logical instruction set of 8086.</li> <li>3. Develop the assembly level programming using 8086 loop instruction set.</li> <li>4. Write programs based on string and procedure for 8086 microprocessor.</li> <li>5. Analyze abstract problems and apply a combination of hardware and software to address the problem</li> <li>6. Make use of standard test and measurement equipment to evaluate digital interfaces</li> </ol>
12.	17CSU512 B	Digital Image Processing – Practical	<ol style="list-style-type: none"> <li>1. Remember the fundamental concepts of image processing.</li> <li>2. Explain different Image enhancement techniques</li> <li>3. Understand and review image transforms</li> <li>4. Analyze the basic algorithms used for image processing &amp; image compression with morphological image processing.</li> <li>5. Contrast Image Segmentation and Representation</li> <li>6. Design &amp; Synthesize Color image processing and its real world applications</li> </ol>
13.	17CSU513 A	Machine Learning – Practical	On successful completion of the course the student should be <ol style="list-style-type: none"> <li>1. Remember the basic concepts and techniques of Machine Learning.</li> <li>2. Develop skills of using recent machine learning software for solving practical problems.</li> <li>3. of doing independent study and research.</li> <li>4. To recognize the characteristics of machine learning that make it useful to real-world problems.</li> <li>5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.</li> <li>6. To effectively use machine learning toolboxes.</li> </ol>
14.	17CSU513 B	Introduction to Data Sciences – Practical	<ol style="list-style-type: none"> <li>1. Install and use R for simple programming tasks.</li> <li>2. Extend the functionality of R by using add-on packages</li> <li>3. Extract data from files and other sources and perform various data manipulation tasks on them.</li> <li>4. Code statistical functions in R.</li> <li>5. Use R Graphics and Tables to visualize results of various statistical operations on data.</li> <li>6. Apply the knowledge of R gained to data Analytics for real life applications.</li> </ol>

15	17CSU514 A	Oracle (SQL/PL- SQL) – Practical	<ol style="list-style-type: none"> <li>1. Understand the ORACLE software for developing databases and using them.</li> <li>2. Using the SQL *plus interface and its commands.</li> <li>3. creating, altering tables, views, indexes ,synonyms and constraints using DDL statements.</li> <li>4. Querying the database using DML statements and write complex queries for information retrieval.</li> <li>5. Apply transaction controls statements in Oracle</li> <li>6. Write procedures and functions using PL/SQL.</li> </ol>
16.	17CSU514 B	Programming in Python – Practical	<p>Upon completion of this the course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Structure simple Python programs for solving problems.</li> <li>3. Learn to use logical constructs in Python</li> <li>4. Decompose a Python program into functions.</li> <li>5. Represent compound data using Python lists, tuples, dictionaries.</li> <li>6. Read and write data from/to files in Python Programs.</li> </ol>
17.	17CSU601 A	Cloud Computing	<p>Upon completion of this course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.</li> <li>2. Know the architecture of the cloud and the usage of clouds.</li> <li>3. Secure their data from the security issues.</li> <li>4. Make the students to work based on the various service level agreements.</li> <li>5. Work with the traditional cloud and Microsoft azure, etc.</li> <li>6. Provide a good understanding of the concepts, standards and protocols in Cloud computing</li> </ol>
18.	17CSU601 B	System Programming	<ol style="list-style-type: none"> <li>1. Understand different components of system software.</li> <li>2. This course enables for good understanding of the role of system programming and the scope of duties and tasks of a system programmer.</li> <li>3. This course enables to learn the concepts and principles of developing system-level software (e.g., compiler, and networking software)</li> <li>4. Understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.</li> <li>5. Describe the various concepts of assemblers and macroprocessors.</li> <li>6. Understand how linker and loader create an executable program from an object module created by assembler and compiler.</li> </ol>
19.	17CSU602 A	Data Mining	<p>pon completion of this course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts and techniques of Data Mining</li> <li>2. Extract knowledge using data mining techniques and Implement Pre-process the data for mining applications and apply the association rules for mining the data</li> <li>3. Design and deploy appropriate classification techniques</li> <li>4. Understand the concept of clustering and its real time applications</li> <li>5. Explore recent trends in data mining such as web mining, spatial-temporal mining</li> </ol>

			6. Analyze the basic concepts of data warehouse and OLAP operations
20.	17CSU602 B	Computer Graphics	<ol style="list-style-type: none"> <li>1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.</li> <li>2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.</li> <li>3. Use of geometric transformations on graphics objects and their application in composite form.</li> <li>4. Extract scene with different clipping methods and its transformation to graphics display device.</li> <li>5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.</li> <li>6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this.</li> </ol>
21.	17CSU603 A	PHP Programming	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Write PHP scripts using operators to perform various functions</li> <li>2. Design PHP scripts to handle HTML forms.</li> <li>3. Implement different types of PHP functions.</li> <li>4. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>5. Create PHP scripts using array.</li> <li>6. Develop dynamic web pages.</li> </ol>
22.	17CSU603 B	Unix / Linux Programming	<ol style="list-style-type: none"> <li>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.</li> <li>2. Implement operating system abstractions in the development of application programs</li> <li>3. Apply the principles of concurrency and synchronization to write correct concurrent programs/software</li> <li>4. Implement basic resource management techniques like scheduling or time management, space management</li> <li>5. Learn about processes and processor management, memory management schemes, file system and secondary storage management.</li> <li>6. Learn about issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection</li> </ol>
23.	17CSU611 A	Cloud Computing – Practical	<p>Upon completion of this course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.</li> <li>2. Know the architecture of the cloud and the usage of clouds.</li> <li>3. Secure their data from the security issues.</li> <li>4. Make the students to work based on the various service level agreements.</li> <li>5. Work with the traditional cloud and Microsoft azure, etc.</li> <li>6. Provide a good understanding of the concepts, standards and protocols in Cloud computing</li> </ol>
24.	17CSU611 B	System Programming – Practical	<ol style="list-style-type: none"> <li>1. Understand different components of system software.</li> <li>2. This course enables for good understanding of the role of system programming and the scope of duties and tasks of a system programmer.</li> </ol>

			<ol style="list-style-type: none"> <li>3. This course enables to learn the concepts and principles of developing system-level software (e.g., compiler, and networking software)</li> <li>4. Understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.</li> <li>5. Describe the various concepts of assemblers and macroprocessors.</li> <li>6. Understand how linker and loader create an executable program from an object module created by assembler and compiler.</li> </ol>
25.	17CSU612 A	Data Mining – Practical	<p>Upon completion of this course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts and techniques of Data Mining</li> <li>2. Extract knowledge using data mining techniques and Implement Preprocess the data for mining applications and apply the association rules for mining the data</li> <li>3. Design and deploy appropriate classification techniques</li> <li>4. Understand the concept of clustering and its real time applications</li> <li>5. Explore recent trends in data mining such as web mining, spatial-temporal mining</li> <li>6. Analyze the basic concepts of data warehouse and OLAP operations</li> </ol>
26.	17CSU612 B	Computer Graphics – Practical	<ol style="list-style-type: none"> <li>1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.</li> <li>2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.</li> <li>3. Use of geometric transformations on graphics objects and their application in composite form.</li> <li>4. Extract scene with different clipping methods and its transformation to graphics display device.</li> <li>5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.</li> <li>6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this.</li> </ol>
27.	17CSU613 A	PHP Programming –Practical	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Write PHP scripts using operators to perform various functions</li> <li>2. Design PHP scripts to handle HTML forms.</li> <li>3. Implement different types of PHP functions.</li> <li>4. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>5. Create PHP scripts using array.</li> <li>6. Develop dynamic web pages.</li> </ol>
28.	17CSU613 B	Unix / Linux Programming – Practical	<ol style="list-style-type: none"> <li>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.</li> <li>2. Implement operating system abstractions in the development of application programs</li> <li>3. Apply the principles of concurrency and synchronization to write correct concurrent programs/software</li> <li>4. Implement basic resource management techniques like scheduling or time management, space management</li> </ol>

			<ol style="list-style-type: none"> <li>5. Learn about processes and processor management, memory management schemes, file system and secondary storage management.</li> <li>6. Learn about issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection</li> </ol>
29.	18CSU301	Data Structures	<ol style="list-style-type: none"> <li>1. Implement abstract data types for linear data structures.</li> <li>2. Apply the different linear and non-linear data structures to problem solutions.</li> <li>3. Analyze the applications of tree.</li> <li>4. Implement graph theory over various data structures.</li> <li>5. Critically analyze the various sorting algorithms.</li> <li>7. Apply searching algorithms over various data structures.</li> </ol>
30.	18CSU302	Operating Systems	<ol style="list-style-type: none"> <li>1. Design various Scheduling algorithms.</li> <li>2. Apply the principles of concurrency.</li> <li>3. Design deadlock, prevention and avoidance algorithms.</li> <li>4. Compare and contrast various memory management schemes.</li> <li>5. Apply the Security Concepts based on Authentication.</li> <li>8. Work in MS Windows and LINUX environment.</li> </ol>
31.	18CSU303	Computer Networks	<ol style="list-style-type: none"> <li>1. Understand the functions of each layer in OSI and TCP/IP model.</li> <li>2. Explain the multiplexing, switching concept and types of transmission media with real time examples.</li> <li>3. Understand the error detection and correction methods and can implement the data link layer protocols</li> <li>4. Understand channel error detection and correction, MAC protocols, Ethernet and WLAN.</li> <li>5. Learn different medium access method to avoid collision and to learn about routing table.</li> <li>9. Learn basic functionalities of transport layer and application layer.</li> </ol>
32.	18CSU304 A	Android Programming	<ol style="list-style-type: none"> <li>1. Design and develop useful Android applications with compelling user interfaces by using, extending, and creating your own layouts and Views and using Menus.</li> <li>2. Analyze the Architecture and features of Android with another Mobile Operating System.</li> <li>3. Evaluate the standard of Kotlin language for developing Android Applications</li> <li>4. Apply knowledge for creating user Interface and develop activity for Android App.</li> <li>5. Evaluate the user interface architecture of Android for developing Android Apps</li> <li>10. Understand the implementation of SQLite database operations with Android.</li> </ol>
33.	18CSU304 B	Programming in Visual Basic / Gambas	<ol style="list-style-type: none"> <li>1. Construct appropriate user interfaces for simple programs, and design systems with minimal complexity and maximal functionality.</li> <li>2. Understand computer programming using the VISUAL BASIC programming language.</li> <li>3. Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.)</li> <li>4. Develop a Graphical User Interface (GUI) based on problem description</li> <li>5. Develop and debug applications using Visual Basic</li> </ol>

			11. Emphasize on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger.
34.	18CSU311	Data Structures – Practical	<ol style="list-style-type: none"> <li>1. Implement abstract data types for linear data structures.</li> <li>2. Apply the different linear and non-linear data structures to problem solutions.</li> <li>3. Analyze the applications of tree.</li> <li>4. Implement graph theory over various data structures.</li> <li>5. Critically analyze the various sorting algorithms.</li> <li>12. Apply searching algorithms over various data structures.</li> </ol>
35.	18CSU312	Operating Systems – Practical	<ol style="list-style-type: none"> <li>1. Design various Scheduling algorithms.</li> <li>2. Apply the principles of concurrency.</li> <li>3. Design deadlock, prevention and avoidance algorithms.</li> <li>4. Compare and contrast various memory management schemes.</li> <li>5. Apply the Security Concepts based on Authentication.</li> <li>13. Work in MS Windows and LINUX environment.</li> </ol>
36.	18CSU313	Computer Networks – Practical	<ol style="list-style-type: none"> <li>1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.</li> <li>2. Simulate and implement stop and wait protocol for noisy channel.</li> <li>3. Simulate and implement go back n sliding window protocol.</li> <li>4. Simulate and implement selective repeat sliding window protocol.</li> <li>5. Simulate and implement distance vector routing algorithm</li> <li>6. Simulate and implement Dijkstra algorithm for shortest path routing.</li> </ol>
37.	18CSU314 A	Android Programming – Practical	<ol style="list-style-type: none"> <li>1. Design and develop useful Android applications with compelling user interfaces by using, extending, and creating your own layouts and Views and using Menus.</li> <li>2. Analyze the Architecture and features of Android with another Mobile Operating System.</li> <li>3. Evaluate the standard of Kotlin language for developing Android Applications</li> <li>4. Apply knowledge for creating user Interface and develop activity for Android App.</li> <li>5. Evaluate the user interface architecture of Android for developing Android Apps</li> <li>6. Understand the implementation of SQLite database operations with Android.</li> </ol>
38.	18CSU314 B	Programming in Visual Basic / Gambas - Practical	<ol style="list-style-type: none"> <li>1. Construct appropriate user interfaces for simple programs, and design systems with minimal complexity and maximal functionality.</li> <li>2. Understand computer programming using the VISUAL BASIC programming language.</li> <li>3. Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.)</li> <li>4. Develop a Graphical User Interface (GUI) based on problem description</li> <li>5. Develop and debug applications using Visual Basic</li> <li>6. Emphasize on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger.</li> </ol>

39.	18CSU401	Design and Analysis of Algorithms	<ol style="list-style-type: none"> <li>1. Learn to choose appropriate advanced data structure for given problem</li> <li>2. Knowledge to calculate complexity.</li> <li>3. Select appropriate design techniques to solve real world problems.</li> <li>4. Apply the dynamic programming technique to solve the problems.</li> <li>5. Apply the greedy programming technique to solve the problems.</li> <li>6. Select a proper pattern matching algorithm for given problem.</li> </ol>
40.	18CSU402	Software Engineering	<ol style="list-style-type: none"> <li>1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.</li> <li>2. Apply systematic procedure for software design and deployment.</li> <li>3. Analyze a problem and identify and define the computing requirements to the problem.</li> <li>4. Formulate appropriate testing strategy for the given software system.</li> <li>5. Develop software projects based on current technology, and test the software using testing tools.</li> <li>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.</li> </ol>
41.	18CSU403	Database Management Systems	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the elementary features of RDBMS</li> <li>2. Design conceptual models of a database using ER modeling for real life applications</li> <li>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database</li> <li>4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database</li> <li>5. Retrieve any type of information from a data base by formulating complex queries in SQL.</li> <li>6. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</li> </ol>
42.	18CSU404 A	HTML Programming	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of HTML and use different formatting options</li> <li>2. Create tables and frames</li> <li>3. Insert a graphic and links within a web page.</li> <li>4. Insert ordered and unordered lists within a web page.</li> <li>5. Use cascading style sheets.</li> <li>6. Validate and publish a web page.</li> </ol>
43.	18CSU404 B	XML Programming	<ol style="list-style-type: none"> <li>1. Learning rules and techniques to create well-formed XML documents, learning to use XML namespaces correctly.</li> <li>2. Constructing Document Type Definitions and XML Schema documents that can be used to validate XML documents (structure, content).</li> <li>3. Developing dynamic web pages using XSL, applying XSLT transformations and formatting to XML documents (XSL, XPath).</li> </ol>

			<ol style="list-style-type: none"> <li>4. Creating valid HTML webpages and Cascading Style Sheets, based on the specifications of W3C.</li> <li>5. Learning to display XML documents using CSS.</li> <li>6. Construction of complex queries over XML documents using XPath and XQuery.</li> </ol>
44.	18CSU411	Design and Analysis of Algorithms - Practical	<ol style="list-style-type: none"> <li>1. Learn to choose appropriate advanced data structure for given problem</li> <li>2. Knowledge to calculate complexity.</li> <li>3. Select appropriate design techniques to solve real world problems.</li> <li>4. Apply the dynamic programming technique to solve the problems.</li> <li>5. Apply the greedy programming technique to solve the problems.</li> <li>6. Select a proper pattern matching algorithm for given problem.</li> </ol>
45.	18CSU412	Software Engineering – Practical	<ol style="list-style-type: none"> <li>1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.</li> <li>2. Apply systematic procedure for software design and deployment.</li> <li>3. Analyze a problem and identify and define the computing requirements to the problem.</li> <li>4. Formulate appropriate testing strategy for the given software system.</li> <li>5. Develop software projects based on current technology, and test the software using testing tools.</li> <li>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.</li> </ol>
46.	18CSU413	Database Management Systems – Practical	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the elementary features of RDBMS</li> <li>2. Design conceptual models of a database using ER modeling for real life applications</li> <li>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database</li> <li>4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database</li> <li>5. Retrieve any type of information from a data base by formulating complex queries in SQL.</li> <li>6. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</li> </ol>
47.	18CSU414 A	HTML Programming – Practical	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of HTML and use different formatting options</li> <li>2. Create tables and frames</li> <li>3. Insert a graphic and links within a web page.</li> <li>4. Insert ordered and unordered lists within a web page.</li> <li>5. Use cascading style sheets.</li> <li>6. Validate and publish a web page.</li> </ol>
48.	18CSU414 B	XML Programming – Practical	<ol style="list-style-type: none"> <li>1. Learning rules and techniques to create well-formed XML documents, learning to use XML namespaces correctly.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Constructing Document Type Definitions and XML Schema documents that can be used to validate XML documents (structure, content).</li> <li>3. Developing dynamic web pages using XSL, applying XSLT transformations and formatting to XML documents (XSL, XPath).</li> <li>4. Creating valid HTML webpages and Cascading Style Sheets, based on the specifications of W3C.</li> <li>5. Learning to display XML documents using CSS.</li> <li>6. Construction of complex queries over XML documents using XPath and XQuery.</li> </ol>
49.	19LSU101	Language – I	<ol style="list-style-type: none"> <li>1. இந்தியகுடியரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய</li> <li>3. ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>4. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல்தமிழ்' 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>5. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> <li>6. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக</li> <li>7. இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி</li> <li>8. மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
50.	19CSU101	Programming Fundamentals using C / C++	<ol style="list-style-type: none"> <li>1. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>2. understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li> <li>3. Understand about the code reusability with the help of user defined functions.</li> <li>4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</li> <li>5. Use the characteristics of an object-oriented programming language in a program.</li> <li>6. Use the basic object-oriented design principles in computer problem solving.</li> </ol>
51.	19CSU102	Computer System Architecture	<ol style="list-style-type: none"> <li>1. Students will acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Solve the problems using Boolean algebra</li> <li>4. Understand the basic computer organization and design.</li> <li>5. learn about Cache memory and its importance</li> </ol>

			6. Solve the binary arithmetic problems and conversion among the number systems
52.	19CSU103	Computer Fundamentals	<ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system,</li> <li>2. Gain knowledge about five generations and classification of computer system,</li> <li>3. Explain the functions of a computer,</li> <li>4. Identify and discuss the functional units of a computer system,</li> <li>5. Identify the various input and output units and explain their purposes</li> <li>6. Understand the emerging technologies and their uses.</li> </ol>
53.	19CSU111	Programming Fundamentals using C / C++ -Practical	<ol style="list-style-type: none"> <li>1. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>2. understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li> <li>3. Understand about the code reusability with the help of user defined functions.</li> <li>4. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.</li> <li>5. Use the characteristics of an object-oriented programming language in a program.</li> <li>6. Use the basic object-oriented design principles in computer problem solving.</li> </ol>
54.	19CSU112	Computer System Architecture - Practical	<ol style="list-style-type: none"> <li>1. Students will acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Solve the problems using Boolean algebra</li> <li>4. Understand the basic computer organization and design.</li> <li>5. learn about Cache memory and its importance</li> <li>6. Solve the binary arithmetic problems and conversion among the number systems</li> </ol>
55.	19CSU113	Computer Fundamentals - Practical	<ol style="list-style-type: none"> <li>1. Modify text using various formatting options from the editing tools under the Home tab</li> <li>2. Set up section breaks to create different headers and footers for the odd and even pages within the document sections.</li> <li>3. Demonstrate the mechanics and uses of Word tables to organize and present data.</li> <li>4. Demonstrate working knowledge of using Word's themes and clip art to create a variety of visual effects.</li> <li>5. Create and design a spreadsheet for general office use.</li> <li>6. Demonstrate the use of basic functions and formulas in Excel</li> </ol>
56.	19AEC101	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
57.	19LSU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்தியகுடியரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய</li> <li>3. ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>4. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல்தமிழ்' 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>5. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> <li>6. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக</li> <li>7. இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி</li> <li>6. மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
58.	19ENU201	English	<ol style="list-style-type: none"> <li>1. Develop the knowledge of interpersonal skills.</li> <li>2. Establish and maintain social relationships.</li> <li>3. Genres of literature will give moral values of life.</li> <li>4. Develop communication skills in business environment</li> <li>5. Communication skills will get developed.</li> <li>8. Develop to have language competence.</li> </ol>
59.	19CSU201	Programming in JAVA	<ol style="list-style-type: none"> <li>1. Student will obtain knowledge of the structure and model of the Java programming language.</li> <li>2. How to use the Java programming language for various programming technologies (understanding)</li> <li>3. Develop software in the Java programming language (application)</li> <li>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</li> <li>5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</li> <li>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</li> </ol>

60.	19CSU202	Discrete Structures	<ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Acquire a fundamental understanding of the core concepts in growth of functions.</li> <li>3. Describe the method of recurrence relations.</li> <li>4. Get wide knowledge about graphs and trees</li> <li>5. Initiate to knowledge from inference theory</li> <li>6. Solve problems with the help of tools of mathematical analysis.</li> </ol>
61.	19CSU203	Computer Networks and Internet Technologies	<ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> <li>3. Identify the different types of network topologies and protocols.</li> <li>4. Enumerate the layers of the OSI model and TCP/IP.</li> <li>5. Gain the skills and project-based experience needed for entry into web design and development careers.</li> <li>6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages.</li> </ol>
62.	19CSU211	Programming in JAVA - Practical	<ol style="list-style-type: none"> <li>1. Student will obtain knowledge of the structure and model of the Java programming language.</li> <li>2. How to use the Java programming language for various programming technologies (understanding)</li> <li>3. Develop software in the Java programming language (application)</li> <li>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</li> <li>5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</li> <li>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</li> </ol>
63.	19CSU212	Discrete Structures - Practical	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Acquire a fundamental understanding of the core concepts in growth of functions.</li> <li>3. Describe the method of recurrence relations.</li> <li>4. Get wide knowledge about graphs and trees</li> <li>5. Initiate to knowledge from inference theory</li> <li>6. Solve problems with the help of tools of mathematical analysis.</li> </ol>
64.	19CSU213	Computer Networks and Internet Technologies - Practical	<ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> <li>3. Identify the different types of network topologies and protocols.</li> <li>4. Enumerate the layers of the OSI model and TCP/IP.</li> <li>5. Gain the skills and project-based experience needed for entry into web design and development careers.</li> <li>6. Select and apply mark-up languages for processing, identifying, and presenting of information in web pages.</li> </ol>



Name of the Department: **Computer Science**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	17ITU501A	Computer Graphics	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. List the basic concepts used in computer graphics.</li><li>2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.</li><li>3. Describe the importance of viewing and projections.</li><li>4. Define the fundamentals of animation, virtual reality and its related technologies,</li><li>5. Understand a typical graphics pipeline</li><li>6. Design an application with the principles of virtual reality</li></ol>
2.	17ITU501B	Software Testing	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. Grasp the fundamentals of a programming language and know the basic differences between programming languages</li><li>2. Choose the architecture based on the problem to be solved.</li><li>3. Differentiate between the types of applications supported by .Net</li><li>4. Build, compile and execute a VB .Net program</li><li>5. Apply techniques to develop error-free software</li><li>6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts</li></ol>
3.	17ITU502A	.NET Programming	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. Grasp the fundamentals of a programming language and know the basic differences between programming languages</li><li>2. Choose the architecture based on the problem to be solved.</li><li>3. Differentiate between the types of applications supported by .Net</li><li>4. Build, compile and execute a VB .Net program</li><li>5. Apply techniques to develop error-free software</li><li>6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts</li></ol>
4.	17ITU502B	Network Programming	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. Analyze the various transmission media, their comparative study, fiber optics and wireless media</li><li>2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites.</li></ol>

			<ol style="list-style-type: none"> <li>3. TCP, UDP, SCTP protocols Ethernet and LAN administration.</li> <li>4. Details of IP operations in the INTERNET and associated routing principles</li> <li>5. Understand the key protocols which support the Internet</li> <li>6. Create applications using techniques such as multiplexing, forking, multithreading</li> </ol>
5.	17ITU503A	Machine Learning	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Have a broad understanding of machine learning algorithms and their use in data-driven knowledge discovery and program synthesis.</li> <li>2. Design and implement several machine learning algorithms in Java.</li> <li>3. Identify, formulate and solve machine learning problems that arise in practical applications.</li> <li>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.</li> <li>5. Identify machine learning techniques suitable for a given problem</li> <li>6. Solve the problems using various machine learning techniques</li> </ol>
6.	17ITU503B	Data Mining	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Introduce students to the basic concepts and techniques of Data Mining.</li> <li>2. Develop skills of using recent data mining software for solving practical problems.</li> <li>3. Gain experience of doing independent study and research.</li> <li>4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning</li> <li>5. Identify appropriate data mining algorithms to solve real world problems</li> <li>6. Benefit the user experiences towards research and innovation. integration</li> </ol>
7.	17ITU504A	Digital Image Processing	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Review the fundamental concepts of a digital image processing system.</li> <li>2. Analyze images in the frequency domain using various transforms.</li> <li>3. Evaluate the techniques for image enhancement and image restoration.</li> <li>4. Categorize various compression techniques.</li> <li>5. Interpret Image compression standards.</li> <li>6. Interpret image segmentation and representation techniques.</li> </ol>
8.	17ITU504B	Multimedia and its Applications	<p>Upon successful completion the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Define multimedia to potential clients.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Identify and describe the function of the general skill sets in the multimedia industry.</li> <li>3. Identify the basic components of a multimedia project.</li> <li>4. Identify the basic hardware and software requirements for multimedia development and playback.</li> <li>5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).</li> <li>6. Use appropriate tools for the design, development and creation of digital media artefacts.</li> </ol>
9.	17ITU511A	Computer Graphics - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. List the basic concepts used in computer graphics.</li> <li>2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.</li> <li>3. Describe the importance of viewing and projections.</li> <li>4. Define the fundamentals of animation, virtual reality and its related technologies,</li> <li>5. Understand a typical graphics pipeline</li> <li>6. Design an application with the principles of virtual reality</li> </ol>
10.	17ITU511B	Software Testing - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</li> <li>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</li> <li>3. Analyze, specify and document software requirements for a software system.</li> <li>4. Verify, validate, assess and assure the quality of software artifacts.</li> <li>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.</li> <li>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.</li> </ol>
11.	17ITU512A	.NET Programming - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Grasp the fundamentals of a programming language and know the basic differences between programming languages</li> <li>2. Choose the architecture based on the problem to be solved.</li> <li>3. Differentiate between the types of applications supported by .Net</li> <li>4. Build, compile and execute a VB .Net program</li> <li>5. Apply techniques to develop error-free software</li> <li>6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general</li> </ol>

			requirements into data-related solutions using database concepts
12.	17ITU512B	Network Programming - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Analyze the various transmission media, their comparative study, fiber optics and wireless media</li> <li>2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites.</li> <li>3. TCP, UDP, SCTP protocols Ethernet and LAN administration.</li> <li>4. Details of IP operations in the INTERNET and associated routing principles</li> <li>5. Understand the key protocols which support the Internet.</li> <li>6. Create applications using techniques such as multiplexing, forking, multithreading</li> </ol>
13.	17ITU513A	Machine Learning - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Have a broad understanding of machine learning algorithms and their use in data-driven knowledge discovery and program synthesis.</li> <li>2. Design and implement several machine learning algorithms in Java.</li> <li>3. Identify, formulate and solve machine learning problems that arise in practical applications.</li> <li>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.</li> <li>5. Identify machine learning techniques suitable for a given problem</li> <li>6. Solve the problems using various machine learning techniques</li> </ol>
14.	17ITU513B	Data Mining - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Introduce students to the basic concepts and techniques of Data Mining.</li> <li>2. Develop skills of using recent data mining software for solving practical problems.</li> <li>3. Gain experience of doing independent study and research.</li> <li>4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning</li> <li>5. Identify appropriate data mining algorithms to solve real world problems</li> <li>6. Benefit the user experiences towards research and innovation. integration</li> </ol>
15.	17ITU514A	Digital Image Processing - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Review the fundamental concepts of a digital image processing system.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Analyze images in the frequency domain using various transforms.</li> <li>3. Evaluate the techniques for image enhancement and image restoration.</li> <li>4. Categorize various compression techniques.</li> <li>5. Interpret Image compression standards.</li> <li>6. Interpret image segmentation and representation techniques.</li> </ol>
16.	17ITU514B	Multimedia and Applications - Practical	<p>Upon successful completion the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Define multimedia to potential clients.</li> <li>2. Identify and describe the function of the general skill sets in the multimedia industry.</li> <li>3. Identify the basic components of a multimedia project.</li> <li>4. Identify the basic hardware and software requirements for multimedia development and playback.</li> <li>5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).</li> <li>6. Use appropriate tools for the design, development and creation of digital media artefacts.</li> </ol>
17.	17ITU601A	PHP Programming	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Write PHP scripts to handle HTML forms.</li> <li>2. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</li> <li>4. Analyze and solve various database tasks using the PHP language.</li> <li>5. Analyze and solve common Web application tasks by writing PHP programs</li> <li>6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website.</li> </ol>
18.	17ITU601B	Unix / Linux Programming	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop software for Linux/UNIX systems.</li> <li>2. Learn the C language and get experience programming in C.</li> <li>3. Learn the important Linux/UNIX library functions and system calls.</li> <li>4. Understand the inner workings of UNIX-like operating systems.</li> <li>5. Obtain a foundation for an advanced course in operating systems.</li> <li>6. Construct various shell scripts for simple applications</li> </ol>
19.	17ITU602A	E-Commerce Technologies	<p>Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe an example of system architecture for an e-Business.</li> <li>2. List the seven major elements of web design.</li> <li>3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.</li> <li>4. Identify the major electronic payment issues and options.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Discuss security issues and explain procedures used to protect against security threats.</li> <li>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</li> </ol>
20.	17ITU602B	Cloud Computing	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.</li> <li>2. Design different workflows according to requirements and apply map reduce programming model.</li> <li>3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.</li> <li>4. CO4: Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds</li> <li>5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.</li> <li>6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.</li> </ol>
21.	17ITU603A	Numerical Methods	<p>On completion of the course students will be able to</p> <ol style="list-style-type: none"> <li>1. Apply Numerical analysis which has enormous application in the field of Science</li> <li>2. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.</li> <li>3. Familiar with calculation and interpretation of errors in numerical method.</li> <li>4. Develop and apply the appropriate numerical techniques for the problem, interpret the results, and assess accuracy.</li> <li>5. Understand the basics of Numerical Differentiation &amp; Integration and numerical solutions of ordinary differential equations.</li> <li>6. Understand the concepts of difference operators and the use of Interpolation.</li> </ol>
22.	17ITU603B	System Programming	<p>Upon completion of the subject, students will be able to</p> <ol style="list-style-type: none"> <li>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</li> <li>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)</li> <li>3. Apply the knowledge and techniques learnt to develop solutions to real world problems</li> <li>4. Select and make use of the OS kernel functions and their APIs, standard programming languages, and utility tools</li> <li>5. Organize and manage software built for deployment and demonstration.</li> <li>6. Analyze requirements and solve problems using systematic planning and development approaches</li> </ol>

23.	17ITU611A	PHP Programming - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Write PHP scripts to handle HTML forms.</li> <li>2. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</li> <li>4. Analyze and solve various database tasks using the PHP language.</li> <li>5. Analyze and solve common Web application tasks by writing PHP programs.</li> <li>6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website.</li> </ol>
24.	17ITU611B	Unix / Linux Programming - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop software for Linux/UNIX systems.</li> <li>2. Learn the C language and get experience programming in C.</li> <li>3. Learn the important Linux/UNIX library functions and system calls.</li> <li>4. Understand the inner workings of UNIX-like operating systems.</li> <li>5. Obtain a foundation for an advanced course in operating systems.</li> <li>6. Construct various shell scripts for simple applications</li> </ol>
25.	17ITU612A	E-Commerce Technologies - Practical	<p>Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe an example of system architecture for an e-Business.</li> <li>2. List the seven major elements of web design.</li> <li>3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.</li> <li>4. Identify the major electronic payment issues and options.</li> <li>5. Discuss security issues and explain procedures used to protect against security threats.</li> <li>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.</li> </ol>
26.	17ITU612B	Cloud Computing – Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.</li> <li>2. Design different workflows according to requirements and apply map reduce programming model.</li> <li>3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.</li> <li>4. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds</li> <li>5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.</li> </ol>

			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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.</li> <li>2. Apply numerical methods to obtain approximate solutions to mathematical problems.</li> <li>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.</li> <li>4. Analyse and evaluate the accuracy of common numerical methods.</li> <li>5. Implement numerical methods in MATLAB.</li> <li>6. Write efficient, well-documented MATLAB code and present numerical results in an informative way.</li> </ol>
28.	17ITU613B	System Programming - Practical	<p>Upon completion of the subject, students will be able to</p> <ol style="list-style-type: none"> <li>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</li> <li>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)</li> <li>3. Apply the knowledge and techniques learnt to develop solutions to real world problems</li> <li>4. Select and make use of the OS kernel functions and their APIs, standard programming languages, and utility tools</li> <li>5. Organize and manage software built for deployment and demonstration.</li> <li>6. Analyze requirements and solve problems using systematic planning and development approaches</li> </ol>
29.	18ITU301	Data Structures	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Choose appropriate data structure as applied to specified problem definition.</li> <li>2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.</li> <li>3. Identify different parameters to analyze the performance of an algorithm.</li> <li>4. Apply concepts learned in various domains like DBMS, compiler construction etc.</li> <li>5. Use linear and non-linear data structures like stacks, queues, linked list etc.</li> <li>6. Illustrate various technique to for searching, Sorting and hashing</li> </ol>
30.	18ITU302	Operating Systems	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the important computer system resources and the</li> </ol>

			<ol style="list-style-type: none"> <li>2. Perform the role of operating system in their management policies and algorithms.</li> <li>3. Understand the process management policies and scheduling of processes by CPU</li> <li>4. Evaluate the requirement for process synchronization and coordination handled by operating system</li> <li>5. Describe and analyze the memory management and its allocation policies.</li> <li>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.</li> </ol>
31.	18ITU303	Relational Database Management Systems	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Explain the features of database management systems and Relational database.</li> <li>2. Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra.</li> <li>3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.</li> <li>4. Retrieve any type of information from a data base by formulating complex queries in SQL.</li> <li>5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</li> <li>6. Build indexing mechanisms for efficient retrieval of information from a database</li> </ol>
32.	18ITU304A	Android Programming	<p>Upon completion of this course, the students will able to</p> <ol style="list-style-type: none"> <li>1. Describe Android platform, Architecture and features.</li> <li>2. Design User Interface and develop activity for Android App.</li> <li>3. Use Internet, Broadcast receivers and Internet services in Android App.</li> <li>4. Design and implement Database Application and Content providers.</li> <li>5. Use multimedia, camera and Location based services in Android App.</li> <li>6. Discuss various security issues in Android platform</li> </ol>
33.	18ITU304B	Programming in Python	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Read, write, execute by hand simple Python programs.</li> <li>3. Structure simple Python programs for solving problems.</li> <li>4. Decompose a Python program into functions.</li> <li>5. Represent compound data using Python lists, tuples, dictionaries.</li> <li>6. Read and write data from/to files in Python Programs.</li> </ol>
34.	18ITU311	Data Structures – Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Choose appropriate data structure as applied to specified problem definition.</li> <li>2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.</li> <li>3. Identify different parameters to analyze the performance of an algorithm.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Apply concepts learned in various domains like DBMS, compiler construction etc.</li> <li>5. Use linear and non-linear data structures like stacks, queues, linked list etc.</li> <li>6. Illustrate various technique to for searching, Sorting and hashing</li> </ol>
35.	18ITU312	Operating Systems – Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the important computer system resources and the</li> <li>2. Perform the role of operating system in their management policies and algorithms.</li> <li>3. Understand the process management policies and scheduling of processes by CPU</li> <li>4. Evaluate the requirement for process synchronization and coordination handled by operating system</li> <li>5. Describe and analyze the memory management and its allocation policies.</li> <li>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.</li> </ol>
36.	18ITU313	RDBMS – Practical	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Explain the features of database management systems and Relational database.</li> <li>2. Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra.</li> <li>3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.</li> <li>4. Retrieve any type of information from a data base by formulating complex queries in SQL.</li> <li>5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</li> <li>6. Build indexing mechanisms for efficient retrieval of information from a database</li> </ol>
37.	18ITU314A	Android Programming – Practical	<p>Upon completion of this course, the students will able to</p> <ol style="list-style-type: none"> <li>1. Describe Android platform, Architecture and features.</li> <li>2. Design User Interface and develop activity for Android App.</li> <li>3. Use Internet, Broadcast receivers and Internet services in Android App.</li> <li>4. Design and implement Database Application and Content providers.</li> <li>5. Use multimedia, camera and Location based services in Android App.</li> <li>6. Discuss various security issues in Android platform</li> </ol>
38.	18ITU314B	Programming in Python – Practical	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Read, write, execute by hand simple Python programs.</li> <li>3. Structure simple Python programs for solving problems.</li> <li>4. Decompose a Python program into functions.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Represent compound data using Python lists, tuples, dictionaries.</li> <li>6. Read and write data from/to files in Python Programs.</li> </ol>
39.	18ITU401	Data Communication and Networks	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Describe the functions of each layer in OSI and TCP/IP model.</li> <li>2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.</li> <li>3. Describe the Session layer design issues and Transport layer services.</li> <li>4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.</li> <li>5. Describe the functions of data link layer and explain the protocols.</li> <li>6. Explain the types of transmission media with real time applications</li> </ol>
40.	18ITU402	Software Engineering	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</li> <li>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</li> <li>3. Analyze, specify and document software requirements for a software system.</li> <li>4. Verify, validate, assess and assure the quality of software artifacts.</li> <li>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.</li> <li>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.</li> </ol>
41.	18ITU403	Programming in PERL	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Focus on new type of programming methods</li> <li>2. Analyze the ease of the language with other languages</li> <li>3. Familiar with implementation of CGI</li> <li>4. Interpret the mathematical results in physical and other forms.</li> <li>5. Identify, formulate and solve the Linear Differential Equations.</li> <li>6. Classify and solve the contour integration of complex functions.</li> </ol>
42.	18ITU404A	Scripting Language	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</li> <li>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</li> <li>3. Use the JavaScript to develop the dynamic web pages.</li> <li>4. Use server side scripting with JSP to generate the web pages dynamically.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Gain knowledge of client side scripting, validation of forms and AJAX programming.</li> <li>6. Create applications by using the concepts like JSP and Servlet</li> </ol>
43.	18ITU404B	XML Programming	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Create a new webpage</li> <li>2. Understand the fundamental features of web applications.</li> <li>3. Understand the objects and components needed for a web designing.</li> <li>4. Understand the current industry support for XML technologies.</li> <li>5. Sharpen the students' practical development skills via focused assignments and projects.</li> <li>6. Understand what is XML and how to parse and use XML Data</li> </ol>
44.	18ITU411	Data Communication and Networks - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the functions of each layer in OSI and TCP/IP model.</li> <li>2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.</li> <li>3. Describe the Session layer design issues and Transport layer services.</li> <li>4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.</li> <li>5. Describe the functions of data link layer and explain the protocols.</li> <li>6. Explain the types of transmission media with real time applications</li> </ol>
45.	18ITU412	Software Engineering - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</li> <li>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</li> <li>3. Implement a given software design using sound development practices.</li> <li>4. Verify, validate, assess and assure the quality of software artifacts.</li> <li>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.</li> <li>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.</li> </ol>
46.	18ITU413	Programming in PERL - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Focus on new type of programming methods</li> <li>2. Analyse the ease of the language with other languages</li> <li>3. Familiar with implementation of CGI</li> </ol>

			<ol style="list-style-type: none"> <li>4. Interpret the mathematical results in physical and other forms.</li> <li>5. Identify, formulate and solve the Linear Differential Equations.</li> <li>6. Classify and solve the contour integration of complex functions.</li> </ol>
47.	18ITU414A	Scripting Language - Practical	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</li> <li>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</li> <li>3. Use the JavaScript to develop the dynamic web pages.</li> <li>4. Use server side scripting with JSP to generate the web pages dynamically.</li> <li>5. Gain knowledge of client side scripting, validation of forms and AJAX programming.</li> <li>6. Create applications by using the concepts like JSP and Servlet.</li> </ol>
48.	18ITU414B	XML Programming - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Create a new webpage</li> <li>2. Understand the fundamental features of web applications.</li> <li>3. Understand the objects and components needed for a web designing.</li> <li>4. Understand the current industry support for XML technologies.</li> <li>5. Sharpen the students' practical development skills via focused assignments and projects.</li> <li>6. Understand what is XML and how to parse and use XML</li> </ol>
49.	19LSU101	Language – I	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> </ol>

			<p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
50.	19ITU101	Programming Fundamentals using C / C++	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.</li> <li>2. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>3. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li> <li>4. Understand about the code reusability with the help of user defined functions.</li> <li>5. Develop advanced applications using enumerated data types, function pointers and nested structures, the basic object-oriented design principles in computer problem solving.</li> <li>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.</li> </ol>
51.	19ITU102	Computer System Architecture	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Solve the problems using Boolean algebra</li> <li>4. Understand the basic computer organization and design.</li> <li>5. Learn about Cache memory and its importance</li> <li>6. Solve the binary arithmetic problems and conversion among the number systems</li> </ol>
52.	19ITU103	Computer Fundamentals	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system,</li> <li>2. Define and distinguish Hardware and Software components of computer system,</li> <li>3. Explain and identify different computing machines during the evolution of computer system, gain knowledge about five generations of computer system,</li> <li>4. Identify and discuss the functional Units of a computer system, identify the various input and output Units and explain their purposes</li> <li>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.</li> </ol>

			6. Understand the classification of computers, distinguish the computers on the basis of purpose, technology and size
53.	19ITU111	Programming Fundamentals using C / C++ - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.</li> <li>2. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>3. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li> <li>4. Understand about the code reusability with the help of user defined functions.</li> <li>5. Develop advanced applications using enumerated data types, function pointers and nested structures, the basic object-oriented design principles in computer problem solving.</li> <li>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.</li> </ol>
54.	19ITU112	Computer System Architecture – Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Solve the problems using Boolean algebra</li> <li>4. Understand the basic computer organization and design.</li> <li>5. Learn about Cache memory and its importance.</li> <li>6. Solve the binary arithmetic problems and conversion among the number systems</li> </ol>
55.	19ITU113	Computer Fundamentals - Practical	<p>After completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. Demonstrate working knowledge of Word's advanced formatting techniques and presentation styles,</li> <li>4. Demonstrate applicable knowledge and uses of accepted business style formatting conventions.</li> <li>5. Create and design a spreadsheet for general office use, demonstrate the basic mechanics and navigation of an Excel spreadsheet.</li> <li>6. Demonstrate formatting techniques and presentation styles, demonstrate the use of basic functions and formulas</li> </ol>

56.	19AEC101	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
57.	19LSU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
58.	19ENU201	English	<ol style="list-style-type: none"> <li>1. Develop the knowledge of interpersonal skills.</li> <li>2. Establish and maintain social relationships.</li> <li>3. Genres of literature will give moral values of life.</li> <li>4. Develop communication skills in business environment</li> <li>5. Communication skills will get developed.</li> <li>6. Develop to have language competence.</li> </ol>
59.	19ITU201	Programming in JAVA	After completion of this course, the students will be able to

			<ol style="list-style-type: none"> <li>1. Obtain knowledge of the structure and model of the Java programming language.</li> <li>2. Use the Java programming language for various programming technologies (understanding)</li> <li>3. Develop software in the Java programming language (application)</li> <li>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</li> <li>5. Use certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</li> <li>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</li> </ol>
60.	19ITU202	Discrete Structures	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Acquire a fundamental understanding of the core concepts in growth of functions.</li> <li>3. Describe the method of recurrence relations.</li> <li>4. Get wide knowledge about graphs and trees</li> <li>5. Initiate to knowledge from inference theory</li> <li>6. Solve problems with the help of tools of mathematical analysis</li> </ol>
61.	19ITU203	Computer Networks and Internet Technologies	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> <li>3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP.</li> <li>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.</li> <li>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.</li> <li>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.</li> </ol>
62.	19ITU211	Programming in JAVA - Practical	<p>After completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Obtain knowledge of the structure and model of the Java programming language.</li> <li>2. Use the Java programming language for various programming technologies (understanding)</li> <li>3. Develop software in the Java programming language (application)</li> </ol>

			<ol style="list-style-type: none"> <li>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</li> <li>5. Use certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</li> <li>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</li> </ol>
63.	19ITU212	Discrete Structures - Practical	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Acquire a fundamental understanding of the core concepts in growth of functions.</li> <li>3. Describe the method of recurrence relations.</li> <li>4. Get wide knowledge about graphs and trees</li> <li>5. Initiate to knowledge from inference theory</li> <li>6. Solve problems with the help of tools of mathematical analysis</li> </ol>
64.	19ITU213	Computer Networks and Internet Technologies Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> <li>3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP.</li> <li>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.</li> <li>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</li> <li>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.</li> </ol>

Name of the Department: **Computer Science**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	17CTU501A	Cryptography and Network Security	After successful completion of the course, the learners would be able to: <ol style="list-style-type: none"><li>1. Illustrate various Public key cryptographic techniques</li><li>2. Evaluate the authentication and hash algorithms</li><li>3. Provide security of the data over the network.</li><li>4. Do research in the emerging areas of cryptography and network security.</li><li>5. Implement various networking protocols.</li><li>6. Protect any network from the threats in the world</li></ol>
2.	17CTU501B	Software Testing	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. Grasp the fundamentals of a programming language and know the basic differences between programming languages</li><li>2. Choose the architecture based on the problem to be solved.</li><li>3. Differentiate between the types of applications supported by .Net</li><li>4. Build, compile and execute a VB .Net program</li><li>5. Apply techniques to develop error-free software.</li><li>6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts</li></ol>
3.	17CTU502A	.NET Programming	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. Grasp the fundamentals of a programming language and know the basic differences between programming languages</li><li>2. Choose the architecture based on the problem to be solved.</li><li>3. Differentiate between the types of applications supported by .Net</li><li>4. Build, compile and execute a VB .Net program</li><li>5. Apply techniques to develop error-free software.</li><li>6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts</li></ol>
4.	17CTU502B	Network Programming	After the completion of this course, a successful student will be able to: <ol style="list-style-type: none"><li>1. Analyze the various transmission media, their comparative study, fibre optics and wireless media</li><li>2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites.</li><li>3. TCP, UDP, SCTP protocols Ethernet and LAN administration.</li></ol>

			<ol style="list-style-type: none"> <li>4. Details of IP operations in the INTERNET and associated routing principles</li> <li>5. Understand the key protocols which support the Internet.</li> <li>6. Create applications using techniques such as multiplexing, forking, multithreading</li> </ol>
5.	17CTU503A	Introduction to Data Science	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the problems solvable with data science and an ability to attack them from a statistical perspective.</li> <li>2. Understand when to use supervised and unsupervised statistical learning methods on labelled and unlabelled data-rich problems.</li> <li>3. Create data analytical pipelines and applications in Python.</li> <li>4. Familiar data science ecosystem and the various tools needed to continue developing as a data scientist.</li> <li>5. Develop the mindset to work like a data scientist, and follow a methodology to tackle different types of data science problems.</li> <li>6. Describe what data science and machine learning are, their applications &amp; use cases, and various types of tasks performed by data scientists</li> </ol>
6.	17CTU503B	Data Mining	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Introduce students to the basic concepts and techniques of Data Mining.</li> <li>2. Develop skills of using recent data mining software for solving practical problems.</li> <li>3. Gain experience of doing independent study and research.</li> <li>4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning</li> <li>5. Identify appropriate data mining algorithms to solve real world problems.</li> <li>6. Benefit the user experiences towards research and innovation. integration</li> </ol>
7.	17CTU504A	Digital Image Processing	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Review the fundamental concepts of a digital image processing system.</li> <li>2. Analyze images in the frequency domain using various transforms.</li> <li>3. Evaluate the techniques for image enhancement and image restoration.</li> <li>4. Categorize various compression techniques.</li> <li>5. Interpret Image compression standards.</li> <li>6. Interpret image segmentation and representation techniques.</li> </ol>
8.	17CTU504B	Multimedia and its Applications	<p>Upon successful completion the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Define multimedia to potential clients.</li> <li>2. Identify and describe the function of the general skill sets in the multimedia industry.</li> <li>3. Identify the basic components of a multimedia project.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Identify the basic hardware and software requirements for multimedia development and playback.</li> <li>5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).</li> <li>6. Use appropriate tools for the design, development and creation of digital media artefacts.</li> </ol>
9.	17CTU511A	Cryptography and Network Security - Practical	<p>After successful completion of the course, the learners would be able to:</p> <ol style="list-style-type: none"> <li>1. Illustrate various Public key cryptographic techniques</li> <li>2. Evaluate the authentication and hash algorithms</li> <li>3. Provide security of the data over the network.</li> <li>4. Do research in the emerging areas of cryptography and network security.</li> <li>5. Implement various networking protocols.</li> <li>6. Protect any network from the threats in the world</li> </ol>
10.	17CTU511B	Software Testing - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</li> <li>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</li> <li>3. Analyze, specify and document software requirements for a software system.</li> <li>4. Verify, validate, assess and assure the quality of software artifacts.</li> <li>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.</li> <li>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.</li> </ol>
11.	17CTU512A	.NET Programming - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Grasp the fundamentals of a programming language and know the basic differences between programming languages</li> <li>2. Choose the architecture based on the problem to be solved.</li> <li>3. Differentiate between the types of applications supported by .Net</li> <li>4. Build, compile and execute a VB .Net program</li> <li>5. Apply techniques to develop error-free software</li> <li>6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts</li> </ol>
12.	17CTU512B	Network Programming - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Analyze the various transmission media, their comparative study, fibre optics and wireless media</li> </ol>

			<ol style="list-style-type: none"> <li>2. Categorize the topologies of networks (LAN and WAN), Layered architecture (OSI and TCP/IP) and protocol suites.</li> <li>3. TCP, UDP, SCTP protocols Ethernet and LAN administration.</li> <li>4. Details of IP operations in the INTERNET and associated routing principles</li> <li>5. Understand the key protocols which support the Internet.</li> <li>6. Create applications using techniques such as multiplexing, forking, multithreading</li> </ol>
13.	17CTU513A	Introduction to Data Science - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the problems solvable with data science and an ability to attack them from a statistical perspective.</li> <li>2. Understand when to use supervised and unsupervised statistical learning methods on labelled and unlabelled data-rich problems.</li> <li>3. Create data analytical pipelines and applications in Python.</li> <li>4. Familiar data science ecosystem and the various tools needed to continue developing as a data scientist.</li> <li>5. Develop the mindset to work like a data scientist, and follow a methodology to tackle different types of data science problems.</li> <li>6. Describe what data science and machine learning are, their applications &amp; use cases, and various types of tasks performed by data scientists</li> </ol>
14.	17CTU513B	Data Mining - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Introduce students to the basic concepts and techniques of Data Mining.</li> <li>2. Develop skills of using recent data mining software for solving practical problems.</li> <li>3. Gain experience of doing independent study and research.</li> <li>4. Possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning</li> <li>5. Identify appropriate data mining algorithms to solve real world problems.</li> <li>6. Benefit the user experiences towards research and innovation, integration</li> </ol>
15.	17CTU514A	Digital Image Processing - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Review the fundamental concepts of a digital image processing system.</li> <li>2. Analyze images in the frequency domain using various transforms.</li> <li>3. Evaluate the techniques for image enhancement and image restoration.</li> <li>4. Categorize various compression techniques.</li> <li>5. Interpret Image compression standards.</li> <li>6. Interpret image segmentation and representation techniques.</li> </ol>

16.	17CTU514B	Multimedia and its Applications - Practical	<p>Upon successful completion the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Define multimedia to potential clients.</li> <li>2. Identify and describe the function of the general skill sets in the multimedia industry.</li> <li>3. Identify the basic components of a multimedia project.</li> <li>4. Identify the basic hardware and software requirements for multimedia development and playback.</li> <li>5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).</li> <li>6. Use appropriate tools for the design, development and creation of digital media artefacts.</li> </ol>
17.	17CTU601A	PHP Programming	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Write PHP scripts to handle HTML forms.</li> <li>2. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</li> <li>4. Analyze and solve various database tasks using the PHP language.</li> <li>5. Analyze and solve common Web application tasks by writing PHP programs</li> <li>6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website.</li> </ol>
18.	17CTU601B	Unix / Linux Programming	<p>be able to</p> <ol style="list-style-type: none"> <li>1. Develop software for Linux/UNIX systems.</li> <li>2. Learn the C language and get experience programming in C.</li> <li>3. Learn the important Linux/UNIX library functions and system calls.</li> <li>4. Understand the inner workings of UNIX-like operating systems.</li> <li>5. Obtain a foundation for an advanced course in operating systems.</li> <li>6. Construct various shell scripts for simple applications</li> </ol>
19.	17CTU602A	E-Commerce Technologies	<p>Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe an example of system architecture for an e-Business.</li> <li>2. List the seven major elements of web design.</li> <li>3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.</li> <li>4. Identify the major electronic payment issues and options.</li> <li>5. Discuss security issues and explain procedures used to protect against security threats.</li> <li>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</li> </ol>
20.	17CTU602B	Cloud Computing	<p>Upon completion of this course, the students will be able to</p>

			<ol style="list-style-type: none"> <li>1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.</li> <li>2. Design different workflows according to requirements and apply map reduce programming model.</li> <li>3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.</li> <li>4. CO4: Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds</li> <li>5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.</li> <li>6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.</li> </ol>
21.	17CTU603A	Soft Computing	<p>Upon completion of the course, the student will be able to :</p> <ol style="list-style-type: none"> <li>1. List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.</li> <li>2. Explain the concepts and meta-cognitive of soft computing.</li> <li>3. Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.</li> <li>4. Outline facts to identify process/procedures to handle real world problems using soft computing.</li> <li>5. Evaluate various techniques of soft computing to defend the best working solutions.</li> <li>6. Design hybrid system to revise the principles of soft computing in various applications.</li> </ol>
22.	17CTU603B	System Programming	<p>Upon completion of the subject, students will be able to</p> <ol style="list-style-type: none"> <li>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</li> <li>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)</li> <li>3. Apply the knowledge and techniques learnt to develop solutions to real world problems</li> <li>4. Select and make use of the OS kernel functions and their APIs, standard programming languages, and utility tools</li> <li>5. Organize and manage software built for deployment and demonstration.</li> <li>6. Analyze requirements and solve problems using systematic planning and development approaches</li> </ol>
23.	17CTU611A	PHP Programming - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Write PHP scripts to handle HTML forms.</li> <li>2. Write regular expressions including modifiers, operators, and metacharacters.</li> <li>3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.</li> <li>4. Analyze and solve various database tasks using the PHP language.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Analyze and solve common Web application tasks by writing PHP programs</li> <li>6. Get hands on experience on various techniques of web development and will be able to design and develop a complete website.</li> </ol>
24.	17CTU611B	Unix / Linux Programming - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop software for Linux/UNIX systems.</li> <li>2. Learn the C language and get experience programming in C.</li> <li>3. Learn the important Linux/UNIX library functions and system calls.</li> <li>4. Understand the inner workings of UNIX-like operating systems.</li> <li>5. Obtain a foundation for an advanced course in operating systems.</li> <li>6. Construct various shell scripts for simple applications</li> </ol>
25.	17CTU612A	E-Commerce Technologies - Practical	<p>Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe an example of system architecture for an e-Business.</li> <li>2. List the seven major elements of web design.</li> <li>3. Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.</li> <li>4. Identify the major electronic payment issues and options.</li> <li>5. Discuss security issues and explain procedures used to protect against security threats.</li> <li>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.</li> </ol>
26.	17CTU612B	Cloud Computing - Practical	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.</li> <li>2. Design different workflows according to requirements and apply map reduce programming model.</li> <li>3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.</li> <li>4. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds</li> <li>5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.</li> <li>6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.</li> </ol>
27.	17CTU613A	Soft Computing - Practical	<p>Upon completion of the course, the student will be able to :</p> <ol style="list-style-type: none"> <li>1. List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.</li> <li>2. Explain the concepts and meta-cognitive of soft computing.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.</li> <li>4. Outline facts to identify process/procedures to handle real world problems using soft computing.</li> <li>5. Evaluate various techniques of soft computing to defend the best working solutions.</li> <li>6. Design hybrid system to revise the principles of soft computing in various applications.</li> </ol>
28.	17CTU613B	System Programming - Practical	<p>Upon completion of the subject, students will be able to</p> <ol style="list-style-type: none"> <li>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</li> <li>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)</li> <li>3. Apply the knowledge and techniques learnt to develop solutions to real world problems</li> <li>4. Select and make use of the OS kernel functions and their APIs, standard programming languages, and utility tools</li> <li>5. Organize and manage software built for deployment and demonstration.</li> <li>6. Analyze requirements and solve problems using systematic planning and development approaches</li> </ol>
29.	18CTU301	Data Structures	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Choose appropriate data structure as applied to specified problem definition.</li> <li>2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.</li> <li>3. Identify different parameters to analyze the performance of an algorithm.</li> <li>4. Apply concepts learned in various domains like DBMS, compiler construction etc.</li> <li>5. Use linear and non-linear data structures like stacks, queues, linked list etc.</li> <li>6. Illustrate various technique to for searching, Sorting and hashing</li> </ol>
30.	18CTU302	Data Communication and Networks	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Describe the functions of each layer in OSI and TCP/IP model.</li> <li>2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.</li> <li>3. Describe the Session layer design issues and Transport layer services.</li> <li>4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.</li> <li>5. Describe the functions of data link layer and explain the protocols.</li> <li>6. Explain the types of transmission media with real time applications</li> </ol>
31.	18CTU303	Relational Database	<p>Upon completion of the course, students will be able to</p>

		Management Systems	<ol style="list-style-type: none"> <li>1. Explain the features of database management systems and Relational database.</li> <li>2. Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra.</li> <li>3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.</li> <li>4. Retrieve any type of information from a data base by formulating complex queries in SQL.</li> <li>5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.</li> <li>6. Build indexing mechanisms for efficient retrieval of information from a database</li> </ol>
32.	18CTU304A	Android Programming	<p>Upon completion of this course, the students will able to</p> <ol style="list-style-type: none"> <li>1. Describe Android platform, Architecture and features.</li> <li>2. Design User Interface and develop activity for Android App.</li> <li>3. Use Internet, Broadcast receivers and Internet services in Android App.</li> <li>4. Design and implement Database Application and Content providers.</li> <li>5. Use multimedia, camera and Location based services in Android App.</li> <li>6. Discuss various security issues in Android platform</li> </ol>
33.	18CTU304B	Programming in Python	<p>Upon completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop algorithmic solutions to simple computational problems</li> <li>2. Read, write, execute by hand simple Python programs.</li> <li>3. Structure simple Python programs for solving problems.</li> <li>4. Decompose a Python program into functions.</li> <li>5. Represent compound data using Python lists, tuples, dictionaries.</li> <li>6. Read and write data from/to files in Python Programs.</li> </ol>
34.	18CTU401	Operating Systems	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the important computer system resources and the</li> <li>2. Perform the role of operating system in their management policies and algorithms.</li> <li>3. Understand the process management policies and scheduling of processes by CPU</li> <li>4. Evaluate the requirement for process synchronization and coordination handled by operating system</li> <li>5. Describe and analyze the memory management and its allocation policies.</li> <li>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.</li> </ol>
35.	18CTU402	Software Engineering	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</li> <li>3. Analyze, specify and document software requirements for a software system.</li> <li>4. Verify, validate, assess and assure the quality of software artifacts.</li> <li>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.</li> <li>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.</li> </ol>
36.	18CTU403	Artificial Intelligence	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Identify problems that are amenable to solution by AI methods.</li> <li>2. Identify appropriate AI methods to solve a given problem.</li> <li>3. Formalize a given problem in the language/framework of different AI methods.</li> <li>4. Implement basic AI algorithms.</li> <li>5. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.</li> <li>6. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems</li> </ol>
37.	18CTU404A	Scripting Language	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</li> <li>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</li> <li>3. Use the JavaScript to develop the dynamic web pages.</li> <li>4. Use server side scripting with JSP to generate the web pages dynamically.</li> <li>5. Gain knowledge of client side scripting, validation of forms and AJAX programming.</li> <li>6. Create applications by using the concepts like JSP and Servlet</li> </ol>
38.	18CTU404B	XML Programming	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Create a new webpage</li> <li>2. Understand the fundamental features of web applications.</li> <li>3. Understand the objects and components needed for a web designing.</li> <li>4. Understand the current industry support for XML technologies.</li> <li>5. Sharpen the students' practical development skills via focused assignments and projects.</li> <li>6. Understand what is XML and how to parse and use XML Data</li> </ol>

39.	18CTU411	Operating Systems - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the important computer system resources and the</li> <li>2. Perform the role of operating system in their management policies and algorithms.</li> <li>3. Understand the process management policies and scheduling of processes by CPU</li> <li>4. Evaluate the requirement for process synchronization and coordination handled by operating system</li> <li>5. Describe and analyze the memory management and its allocation policies.</li> <li>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.</li> </ol>
40.	18CTU412	Software Engineering - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply their knowledge of mathematics, sciences, and computer science to the modelling, analysis, and measurement of software artifacts.</li> <li>2. Work effectively as leader/member of a development team to deliver quality software artifacts.</li> <li>3. Implement a given software design using sound development practices.</li> <li>4. Verify, validate, assess and assure the quality of software artifacts.</li> <li>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.</li> <li>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.</li> </ol>
41.	18CTU413	Artificial Intelligence - Practical	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Identify problems that are amenable to solution by AI methods.</li> <li>2. Identify appropriate AI methods to solve a given problem.</li> <li>3. Formalize a given problem in the language/framework of different AI methods.</li> <li>4. Implement basic AI algorithms.</li> <li>5. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.</li> <li>6. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems</li> </ol>
42.	18CTU414A	Scripting Language - Practical	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Define the CSS with its types and use them to provide the styles to the web pages at various levels.</li> <li>2. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.</li> <li>3. Use the JavaScript to develop the dynamic web pages.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Use server side scripting with JSP to generate the web pages dynamically.</li> <li>5. Gain knowledge of client side scripting, validation of forms and AJAX programming.</li> <li>6. Create applications by using the concepts like JSP and Servlet.</li> </ol>
43.	18CTU414B	XML Programming - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Create a new webpage</li> <li>2. Understand the fundamental features of web applications.</li> <li>3. Understand the objects and components needed for a web designing.</li> <li>4. Understand the current industry support for XML technologies.</li> <li>5. Sharpen the students' practical development skills via focused assignments and projects.</li> <li>6. Understand what is XML and how to parse and use XML Data</li> </ol>
44.	19LSU101	Language – I	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
45.	19CTU101	Programming Fundamentals using C / C++	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.</li> <li>2. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>3. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li> <li>4. Understand about the code reusability with the help of user defined functions.</li> <li>5. Develop advanced applications using enumerated data types, function pointers and nested structures, the basic object-oriented design principles in computer problem solving.</li> </ol>

			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.
46.	19CTU102	Computer System Architecture	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Solve the problems using Boolean algebra</li> <li>4. Understand the basic computer organization and design.</li> <li>5. Learn about Cache memory and its importance</li> <li>6. Solve the binary arithmetic problems and conversion among the number systems</li> </ol>
47.	19CTU103	Computer Fundamentals	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system,</li> <li>2. Define and distinguish Hardware and Software components of computer system,</li> <li>3. Explain and identify different computing machines during the evolution of computer system, gain knowledge about five generations of computer system,</li> <li>4. Identify and discuss the functional Units of a computer system, identify the various input and output Units and explain their purposes</li> <li>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.</li> <li>6. Understand the classification of computers, distinguish the computers on the basis of purpose, technology and size</li> </ol>
48.	19CTU111	Programming Fundamentals using C / C++ - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Obtain the knowledge about the number systems this will be very useful for bitwise operations.</li> <li>2. Develop programs using the basic elements like control statements, Arrays and Strings.</li> <li>3. Understand about the dynamic memory allocation using pointers which is essential for utilizing memory</li> <li>4. Understand about the code reusability with the help of user defined functions.</li> <li>5. Develop advanced applications using enumerated data types, function pointers and nested structures, the basic object-oriented design principles in computer problem solving.</li> <li>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.</li> </ol>

49.	19CTU112	Computer System Architecture - Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire a basic knowledge about computer system architecture, digital circuits and the low - level programming skills.</li> <li>2. Understand the inner workings and performance capabilities of advanced microprocessors.</li> <li>3. Solve the problems using Boolean algebra</li> <li>4. Understand the basic computer organization and design.</li> <li>5. Learn about Cache memory and its importance</li> <li>6. Solve the binary arithmetic problems and conversion among the number systems</li> </ol>
50.	19CTU113	Computer Fundamentals - Practical	<p>After completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. Demonstrate working knowledge of Word's advanced formatting techniques and presentation styles,</li> <li>4. Demonstrate applicable knowledge and uses of accepted business style formatting conventions.</li> <li>5. Create and design a spreadsheet for general office use, demonstrate the basic mechanics and navigation of an Excel spreadsheet.</li> <li>6. Demonstrate formatting techniques and presentation styles, demonstrate the use of basic functions and formulas</li> </ol>
51.	19AEC101	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
52.	19LSU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு'</li> </ol>

			<p>குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</p> <p>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</p> <p>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</p> <p>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.</p> <p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
53.	19ENU201	English	<p>1. Develop the knowledge of interpersonal skills.</p> <p>2. Establish and maintain social relationships.</p> <p>3. Genres of literature will give moral values of life.</p> <p>4. Develop communication skills in business environment</p> <p>5. Communication skills will get developed.</p> <p>6. Develop to have language competence.</p>
54.	19CTU201	Programming in JAVA	<p>After completion of this course, the students will be able to</p> <p>1. Obtain knowledge of the structure and model of the Java programming language.</p> <p>2. Use the Java programming language for various programming technologies (understanding)</p> <p>3. Develop software in the Java programming language (application)</p> <p>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</p> <p>5. Use certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</p> <p>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</p>
55.	19CTU202	Discrete Structures	<p>On successful completion of the course, students will be able to</p> <p>1. Familiar with elementary algebraic set theory.</p> <p>2. Acquire a fundamental understanding of the core concepts in growth of functions.</p> <p>3. Describe the method of recurrence relations.</p> <p>4. Get wide knowledge about graphs and trees</p> <p>5. Initiate to knowledge from inference theory</p>

			6. Solve problems with the help of tools of mathematical analysis
56.	19CTU203	Computer Networks and Internet Technologies	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> <li>3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP.</li> <li>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.</li> <li>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</li> <li>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.</li> </ol>
57.	19CTU211	Programming in JAVA - Practical	<p>After completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Obtain knowledge of the structure and model of the Java programming language.</li> <li>2. Use the Java programming language for various programming technologies (understanding)</li> <li>3. Develop software in the Java programming language (application)</li> <li>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)</li> <li>5. Use certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)</li> <li>6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)</li> </ol>
58.	19CTU212	Discrete Structures - Practical	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Familiar with elementary algebraic set theory.</li> <li>2. Acquire a fundamental understanding of the core concepts in growth of functions.</li> <li>3. Describe the method of recurrence relations.</li> <li>4. Get wide knowledge about graphs and trees</li> <li>5. Initiate to knowledge from inference theory</li> <li>6. Solve problems with the help of tools of mathematical analysis</li> </ol>
59.	19CTU213	Computer Networks and Internet Technologies Practical	<p>After the completion of this course, a successful student will be able to:</p> <ol style="list-style-type: none"> <li>1. Independently understand basic computer network technology.</li> <li>2. Understand and explain Data Communications System and its components.</li> </ol>

			<ol style="list-style-type: none"><li>3. Identify the different types of network topologies and protocols, enumerate the layers of the OSI model and TCP/IP.</li><li>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.</li><li>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</li><li>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.</li></ol>
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Name of the Department: **Computer Science**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	18CSP301	J2EE	<ol style="list-style-type: none"><li>1. Understand the In-depth concepts of JEE</li><li>2. Understand the in-depth Life cycle of servlets and JSP.</li><li>3. Learn how to communicate with databases using Java.</li><li>4. Handle Errors and Exceptions in Web Applications</li><li>5. Use NetBeans IDE for creating J2EE Applications</li><li>6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications</li></ol>
2.	18CSP302	Open Source Technologies	<p>At the end of the course the student will be in a position to –</p> <ol style="list-style-type: none"><li>1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.</li><li>2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.</li><li>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.</li><li>4. Develop applications where several processes need to communicate with each other to complete a task.</li><li>5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.</li><li>6. Write programs which employs advanced concepts like multithreading.</li></ol>
3.	18CSP303	Digital Image Processing	<ol style="list-style-type: none"><li>1. Perform image manipulations and analysis in many different fields.</li><li>2. Apply knowledge of computing mathematics science and engineering to solve problems in multidisciplinary research.</li><li>3. Implement the understanding in sharpening the image.</li><li>4. Perform the image segmentation using the compression method.</li><li>5. Understand the image to represent in an region.</li><li>6. Analyze the basic algorithms used for image processing &amp; image compression with morphological image processing.</li></ol>
4.	18CSP304	Green Computing	<ol style="list-style-type: none"><li>1. Give an account of the concept green IT,</li><li>2. Give an account of Green Assets and Modelling,</li><li>3. Describe green IT in grid framework in relation to technology,</li><li>4. Relate green IT to sustainable development,</li><li>5. Evaluate IT use in relation to environmental perspectives,</li><li>6. Analyze case studies based on green IT.</li></ol>
5.	18CSP305B	Wireless Application Protocol	<ol style="list-style-type: none"><li>1. Pursue research in the area of wireless communication.</li><li>2. Develop applications that are mobile-device specific and demonstrate current practice in mobile communication contexts.</li></ol>

			<ol style="list-style-type: none"> <li>3. Understand Components of the WAP Standards and Wireless Telephony Applications</li> <li>4. Appreciate the contribution of Wireless Communication networks to overall technological growth.</li> <li>5. Compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.</li> <li>6. Design and Develop a wireless application using WML</li> </ol>
6.	18CSP311	J2EE - Practical	<ol style="list-style-type: none"> <li>1. Understand the In-depth concepts of JEE</li> <li>2. Understand the in-depth Life cycle of servlets and JSP.</li> <li>3. Learn how to communicate with databases using Java.</li> <li>4. Handle Errors and Exceptions in Web Applications</li> <li>5. Use NetBeans IDE for creating J2EE Applications</li> <li>6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications</li> </ol>
7.	18CSP312	Linux - Practical	<p>At the end of the course the student will be in a position to –</p> <ol style="list-style-type: none"> <li>1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.</li> <li>2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.</li> <li>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.</li> <li>4. Develop applications where several processes need to communicate with each other to complete a task.</li> <li>5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.</li> <li>6. Write programs which employs advanced concepts like multithreading.</li> </ol>
8.	19CSP101	Python Programming	<ol style="list-style-type: none"> <li>1. Master an understanding of scripting and the contributions of scripting languages.</li> <li>2. Master an understanding of Python especially the object oriented concepts</li> <li>3. Master an understanding of the built in objects of Python</li> <li>4. Represent compound data using Python lists, tuples, dictionaries.</li> <li>5. Read and write data from/to files in Python Programs.</li> <li>6. Be exposed to advanced applications such as TCP/IP network programming, multithreaded programming, Web applications.</li> </ol>
9.	19CSP102	Big Data Analytics	<p>On successful completion of the course the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Apply Hadoop ecosystem components.</li> <li>2. Access and Process Data on Hbase, Pig and HiveQL queries</li> <li>3. Manage Job Execution in Hadoop Environment</li> <li>4. Analyze Map Reduce Types</li> <li>5. Apply Data Model and Connect your data and Dashboard.</li> <li>6. Participate data science and big data analytics projects</li> </ol>

10.	19CSP103	Cryptography and Network Security	<p>On successful completion of the course the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Classify the symmetric encryption techniques</li> <li>2. Illustrate various Public key cryptographic techniques</li> <li>3. Evaluate the authentication and hash algorithms.</li> <li>4. Summarize the intrusion detection and its solutions to overcome the attacks.</li> <li>5. Understand basic concepts of system level security</li> <li>6. Build secure authentication systems by use of message authentication techniques.</li> </ol>
11.	19CSP104	Cloud Computing	<p>Upon completion of this course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.</li> <li>2. Know the architecture of the cloud and the usage of clouds.</li> <li>3. Secure their data from the security issues.</li> <li>4. Make the students to work based on the various service level agreements.</li> <li>5. Work with the traditional cloud and Microsoft azure, etc.</li> <li>6. Provide a good understanding of the concepts, standards and protocols in Cloud computing</li> </ol>
12.	19CSP105A	Wireless and Mobile Computing	<ol style="list-style-type: none"> <li>1. Grasp the concepts and features of mobile computing technologies and applications</li> <li>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</li> <li>3. Identify the important issues of developing mobile computing systems and applications</li> <li>4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities;</li> <li>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;</li> <li>6. Organize and manage software built for deployment and demonstration.</li> </ol>
13.	19CSP111	Python Programming - Practical	<ol style="list-style-type: none"> <li>1. Master an understanding of scripting and the contributions of scripting languages.</li> <li>2. Master an understanding of Python especially the object oriented concepts</li> <li>3. Master an understanding of the built in objects of Python</li> <li>4. Represent compound data using Python lists, tuples, dictionaries.</li> <li>5. Read and write data from/to files in Python Programs.</li> <li>6. Be exposed to advanced applications such as TCP/IP network programming, multithreaded programming, Web applications</li> </ol>

14.	19CSP112	Hadoop - Practical	<p>On successful completion of the course the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Apply Hadoop ecosystem components.</li> <li>2. Access and Process Data on Hbase, Pig and HiveQL queries</li> <li>3. Manage Job Execution in Hadoop Environment</li> <li>4. Analyze Map Reduce Types</li> <li>5. Apply Data Model and Connect your data and Dashboard</li> <li>6. Participate data science and big data analytics projects</li> </ol>
15.	19CSP201	Internetworking with TCP/IP	<p>At the completion of the course, students will:</p> <ol style="list-style-type: none"> <li>1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.</li> <li>2. Understand IP Addressing Fundamentals</li> <li>3. Understand IPv4 forwarding and routing.</li> <li>4. Learn about host name resolution and the Domain Name System (DNS).</li> <li>5. Learn about services and operations of DHCP Servers and Domain Name Servers</li> <li>6. Create major applications using the key TCP/IP protocols</li> </ol>
16.	19CSP202	Cyber Security	<p>A student who successfully completes this course should at a minimum be able to:</p> <ol style="list-style-type: none"> <li>1. State the basic concepts in information security, including security policies, security models, and security mechanisms.</li> <li>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.</li> <li>3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.</li> <li>4. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.</li> <li>5. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.</li> <li>6. The learner will be able to examine secure software development practices.</li> </ol>
17.	19CSP203	MongoDB	<ol style="list-style-type: none"> <li>1. To provide students the right skills and knowledge needed to develop Applications on MongoDB</li> <li>2. To provide students the right skills and knowledge needed to run Applications on MongoDB</li> <li>3. Writing MongoDB programs from JavaScript shell.</li> <li>4. Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB</li> <li>5. Perform query optimization in MongoDB</li> <li>6. Understand replication and sharding in MongoDB</li> </ol>

18.	19CSP204	Internet of Things	<p>A student who successfully completes this course should at a minimum be able to:</p> <ol style="list-style-type: none"> <li>1. Understand building blocks of Internet of Things and characteristics.</li> <li>2. Understand IoT protocols, Web of Things and Integrating IOT.</li> <li>3. Understand the application areas of IOT .</li> <li>4. Realize the revolution of Internet in Mobile Devices, Cloud &amp; Sensor Networks</li> <li>5. Learn about communication technologies used in IoT</li> <li>6. Learn about Web of Things, Structural models and applications of IoT.</li> </ol>
19.	19CSP205B	Machine Learning	<p>On successful completion of the course the student should be</p> <ol style="list-style-type: none"> <li>1. Remember the basic concepts and techniques of Machine Learning.</li> <li>2. Develop skills of using recent machine learning software for solving practical problems.</li> <li>3. of doing independent study and research.</li> <li>4. To recognize the characteristics of machine learning that make it useful to real-world problems.</li> <li>5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.</li> <li>6. To effectively use machine learning toolboxes</li> </ol>
20.	19CSP211	Router Configuration - Practical	<p>At the completion of the course, students will:</p> <ol style="list-style-type: none"> <li>1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.</li> <li>2. Understand the routing IP datagrams and checksum.</li> <li>3. Exposed to unicast and multicast routing.</li> <li>4. Learn about host name resolution and the Domain Name System (DNS).</li> <li>5. Learn about services and operations of DHCP Servers and Domain Name Servers</li> <li>6. Understand about SMTP and SNMP.</li> </ol>
21.	19CSP212	MongoDB - Practical	<ol style="list-style-type: none"> <li>1. To provide students the right skills and knowledge needed to develop Applications on MongoDB</li> <li>2. To provide students the right skills and knowledge needed to run Applications on MongoDB</li> <li>3. Writing MongoDB programs from JavaScript shell.</li> <li>4. Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB</li> <li>5. Perform query optimization in MongoDB</li> <li>6. Understand replication and sharding in MongoDB</li> </ol>

Name of the Department: **Electronics and Communication Systems**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	17ECU501A	Programmable Logic Controller	<ol style="list-style-type: none"> <li>1. Identify the main parts of programmable logic controller</li> <li>2. Develop logic gate circuits for Boolean expressions</li> <li>3. Able to state basic PLC Terminology</li> <li>4. Identify logical process control, in automation.</li> <li>5. Describe how a programmable logic controller is programmed.</li> <li>6. Describe switching elements on input/output modules.</li> </ol>
2.	17ECU501B	Nano Electronics	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of Nano Electronics and its properties.</li> <li>2. Gain the concepts of quantum theory.</li> <li>3. Understand the latest technology on nano systems based Nano electronics</li> <li>4. Identify the various methods to fabricate and measure Nanoscale features.</li> <li>5. Evaluate the critical parameters when considering any new Nano electronics device.</li> <li>6. Understand the applications of Nano Electronics.</li> </ol>
3.	17ECU502A	Advanced Communication Systems	<ol style="list-style-type: none"> <li>1. Understand the need of coding, Channel models, Diversity, Equalization and Channel estimation techniques.</li> <li>2. Understand the Wireless communication systems and its standards</li> <li>3. Apply analytical and empirical models in the design of wireless links.</li> <li>4. Evaluate the characteristics of speech signals and their frequency limitations.</li> <li>5. Describe and evaluate the design and performance of digital and analog circuits.</li> <li>6. Ability to analyse and evaluate digital communication systems.</li> </ol>
4.	17ECU502B	Control Systems	<ol style="list-style-type: none"> <li>1. Understand the concept of time response and frequency response of the system.</li> <li>2. Analyze feedback characteristics of linear control systems to reduce the disturbance.</li> <li>3. Analyze time response of first and second order control systems for different standard test signals.</li> <li>4. Perform frequency domain analysis of linear control system using nyquist stability criterion.</li> <li>5. Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the a system.</li> <li>6. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.</li> </ol>

5.	17ECU503A	Biomedical Instrumentation	<ol style="list-style-type: none"> <li>1. Understand the fundamental concept of origin of Bio-electric signals and recording it with highly precision equipment.</li> <li>2. Differentiate and analyze the biomedical signal sources.</li> <li>3. Identify common biomedical signals and distinguish characteristic features.</li> <li>4. Ability to study various transducers</li> <li>5. Identify common signal artifacts, their sources and formulate strategies for their suppression.</li> <li>6. Familiarize with patient safety issues related to biomedical instrumentation.</li> </ol>
6.	17ECU503B	Signals And Systems	<ol style="list-style-type: none"> <li>1. Understand about various types of signals and systems, classify them, analyze them and perform various operations.</li> <li>2. Understand the use of transform to analysis of signals and systems in continuous and discrete time domain.</li> <li>3. Implement the concept and theory of signals and systems in electronics and communication field.</li> <li>4. Ability to have idea of signal and system analysis and its characterization in time and frequency domain.</li> <li>5. Students can perform mathematical and graphical convolution of signals and systems.</li> <li>6. Compute the Fourier series or Fourier transform Z-transform</li> </ol>
7.	17ECU504A	Robotics	<ol style="list-style-type: none"> <li>1. Understand the relationship between mechanical structures of industrial robots and their operational workspace characteristics.</li> <li>2. Illustrate the kinematics and dynamics of robotics.</li> <li>3. Implementation of related instrumentation and control in robotics.</li> <li>4. Ability to solve inverse kinematics of simple robot manipulators.</li> <li>5. Able to do the path planning for a robotic system.</li> <li>6. Identify a Robot for a specific application.</li> </ol>
8.	17ECU504B	Mobile Applications Development	<ol style="list-style-type: none"> <li>1. Understand system requirements for mobile applications.</li> <li>2. Generate suitable design using specific mobile development framework.</li> <li>3. Apply analytical and empirical models in the design of wireless links.</li> <li>4. Develop user interfaces for the android platform.</li> <li>5. Identify the interaction between user interface and underlying application infrastructure.</li> <li>6. Configure android application development tools.</li> </ol>
9.	17ECU511A	Programmable Logic Controller – Practical	<ol style="list-style-type: none"> <li>1. Connect PLC peripherals with PLC for logical functioning.</li> <li>2. Diagnose faults in programmable logic controller</li> <li>3. Test a programmable logic controller discrete device for correct response.</li> <li>4. Implement logic gate circuits from Boolean expressions</li> </ol>

			<ol style="list-style-type: none"> <li>5. Ability to design and program basic PLC circuits for entry-level PLC Applications.</li> <li>6. Design and program a small, automated industrial production</li> </ol>
10.	17ECU511B	Nano Electronics - Practical	<ol style="list-style-type: none"> <li>1. Ability to perform simple analysis of nano-electronic devices.</li> <li>2. Familiarize with certain nano-electronic systems and its building blocks</li> <li>3. Acquire knowledge on carbon nanotubes and its application sin nano electronics.</li> <li>4. Evaluate the quantum and nanosized scale effects on materials</li> <li>5. Ability to calculate the density of states in nano electronic devices.</li> <li>6. Understand the impact of nanoelectronics onto information technology and communication systems.</li> </ol>
11.	17ECU512A	Advanced Communication Systems - Practical	<ol style="list-style-type: none"> <li>1. Analyze different parameters of analog communication techniques</li> <li>2. Implement various modulation and demodulation techniques of electronic communication systems.</li> <li>3. Evaluate the generation and detection of pulse modulation techniques.</li> <li>4. Familiarize with the design, analysis and operation of electronic communication.</li> <li>5. Identify and solve basic communication problems</li> <li>6. Analyze the transmitter and receiver circuits</li> </ol>
12.	17ECU512B	Control Systems - Practical	<ol style="list-style-type: none"> <li>1. Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a simplified form.</li> <li>2. Characterize any system in Laplace domain to illustrate different specifications of the system using transform function concept.</li> <li>3. Interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis.</li> <li>4. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.</li> <li>5. Formulate different types of analysis in frequency domain to explain the nature of stability of the system.</li> <li>6. Identify the needs of different types of controllers and compensate to ascertain the required dynamic response from the system.</li> </ol>
13.	17ECU513A	Biomedical Instrumentation - Practical	<ol style="list-style-type: none"> <li>1. Get exposure to human body parameter measurement</li> <li>2. Measure non-invasive diagnostic parameters.</li> <li>3. Design and operate biopotential amplifiers.</li> <li>4. Identify common biomedical signals</li> <li>5. Inspect common biomedical signals and distinguish characteristic features.</li> <li>6. Outline the design of cardiac pacemakers and defibrillators.</li> </ol>

14.	17ECU513B	Signals And Systems - Practical	<ol style="list-style-type: none"> <li>1. Observe the effect of various properties and operations of signals and systems.</li> <li>2. Ability to have idea of signal and system analysis and its characterization in time and frequency domain</li> <li>3. Analyse various types of digital signals and perform various operations.</li> <li>4. Compute the Fourier series or Fourier transform Z-transform</li> <li>5. Implement the concept and theory of signals and systems in electronics and communication field.</li> <li>6. Evaluate the time and frequency response of continuous and discrete time signals which are useful to understand the behaviour of electronic communication systems</li> </ol>
15.	17ECU514A	Robotics - Practical	<ol style="list-style-type: none"> <li>1. 1.Ability to apply spatial transformation to obtain forward kinematics equation of robot manipulators,</li> <li>2. Able to generate joint trajectory for motion planning.</li> <li>3. Interface various servo and hardware components with controller based projects.</li> <li>4. Identify parameters required to be controlled in a Robot.</li> <li>5. Develop small automatic applications with the help of robotics.</li> <li>6. Test the robotics circuit.</li> </ol>
16.	17ECU514B	Mobile Applications Development - Practical	<ol style="list-style-type: none"> <li>1. Install and configure android application development tools.</li> <li>2. Design and develop user interfaces for the android platforms.</li> <li>3. Apply java programming concepts to android application techniques.</li> <li>4. Develop various android applications related to layouts and user interactive interfaces.</li> <li>5. Save state information across important operating system events.</li> <li>6. Ability to apply general programming knowledge in the field of developing mobile applications.</li> </ol>
17.	17ECU601A	Embedded Systems	<ol style="list-style-type: none"> <li>1. Understand hardware and software design requirements of embedded systems.</li> <li>2. Acquire knowledge about embedded processors and their applications</li> <li>3. Analyze the embedded systems specification and develop software programs.</li> <li>4. Ability to design an Embedded System, component or process to meet desired needs within realistic constraints.</li> <li>5. Evaluate the requirements of programming embedded systems and tool chain for embedded systems.</li> <li>6. Explore the features of the microcontroller and provide solutions for embedded applications</li> </ol>
18.	17ECU601B	Basic VLSI Design	<ol style="list-style-type: none"> <li>1. Realize logic circuits with different design styles.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Understand working principle of operation of different types of memories.</li> <li>3. Familiarize with the fabrication techniques of Integrated Circuits.</li> <li>4. Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.</li> <li>5. Express the layout of simple MOS Circuit using Lambda based design rules.</li> <li>6. Design an application using Verilog HDL.</li> </ol>
19.	17ECU602A	Digital Signal Processing	<ol style="list-style-type: none"> <li>1. Understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform</li> <li>2. Ability to compute various transform analysis of Linear Time Invariant Systems.</li> <li>3. Implement problem solving strategies to DSP Problems.</li> <li>4. Able to test signal processing algorithms for various applications</li> <li>5. Ability to understand Various applications of DSP such as signal processing and telecommunication.</li> <li>6. Apply design techniques for FIR type digital filters</li> </ol>
20.	17ECU602B	Virtual Instrumentation	<ol style="list-style-type: none"> <li>1. Understand basics of acquisition techniques and its interface.</li> <li>2. Recognize the components of virtual instrumentations and measurement.</li> <li>3. Get adequate knowledge in VI Tool sets.</li> <li>4. Use Lab view software for instrument control, measurement and data acquisition.</li> <li>5. Understand VI Programming techniques.</li> <li>6. Ability to use state machines to solve complex problems.</li> </ol>
21.	17ECU603A	Programming With LABVIEW	<ol style="list-style-type: none"> <li>1. Gain knowledge on the different data types and methods to organize and group data, controls, and indicators in LABVIEW</li> <li>2. Understand various functions available in Lab View for instrumentation applications.</li> <li>3. Ability to model complex system using Lab view.</li> <li>4. Ability to improve lab view programming skills</li> <li>5. Able to use graphical programming language.</li> <li>6. Ability to simulate and test behaviour of system.</li> </ol>
22.	17ECU603B	Verilog And FPGA Based System Design	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of Verilog and FPGA based system design.</li> <li>2. Design and optimize complex combinational and sequential digital circuits</li> <li>3. Apply design flow methodology for a given problem</li> <li>4. Solve time related problems</li> <li>5. Implement and debug various digital designs.</li> <li>6. Analyze a given design based on synthesis, implementation and timing reports</li> </ol>
23.	17ECU611A	Embedded Systems - Practical	<ol style="list-style-type: none"> <li>1. Ability to write the programs for microcontrollers</li> <li>2. Apply and analyze the applications in various processors and domains of embedded systems.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Analyze to understand the different concepts of RTOS, sensors, memory interface and communication interface.</li> <li>4. Incorporate suitable microcontroller along with appropriate interfacing circuits and implement the same for association with software programs.</li> <li>5. Design real time embedded systems using the concepts of RTOS.</li> <li>6. Develop the hardware for embedded system application based on the processors.</li> </ol>
24.	17ECU611B	Basic VLSI Design - Practical	<ol style="list-style-type: none"> <li>1. Design MOSFET based logic circuit.</li> <li>2. Implement logic circuits with different design styles</li> <li>3. Demonstrate an understanding of working principle of operation of different types of memories.</li> <li>4. Demonstrate an understanding of working principle of clocking, power reduction and distribution.</li> <li>5. Familiarize with the fabrication techniques of Integrated Circuits.</li> <li>6. Able to solve performance issues in circuit layout.</li> </ol>
25.	17ECU612A	Digital Signal Processing - Practical	<ol style="list-style-type: none"> <li>1. Ability to design and test signal processing algorithms for various applications</li> <li>2. Able to design and simulate digital filters</li> <li>3. Ability to recover information from signals.</li> <li>4. Evaluate transform analysis of linear time invariant systems.</li> <li>5. Apply digital time signal processing theory to real world signal processing applications.</li> <li>6. Analyze z-transforms and discrete time fourier transforms of digital system</li> </ol>
26.	17ECU612B	Virtual Instrumentation - Practical	<ol style="list-style-type: none"> <li>1. Analyze and design different types of programs based on data acquisition.</li> <li>2. Represent and review signals in digital domain</li> <li>3. Select proper data acquisition hardware.</li> <li>4. Configure data acquisition hardware in Lab view.</li> <li>5. Identify the analysing tools and simple programming in VI</li> <li>6. Design program for application development.</li> </ol>
27.	17ECU613A	Programming With LABVIEW - Practical	<ol style="list-style-type: none"> <li>1. Able to simulate and test behaviour of system.</li> <li>2. Ability to use various hardware interface with graphical programming language.</li> <li>3. Develop basic application in lab view graphical programming environment.</li> <li>4. Acquire date with Lab view and interfacing different instruments.</li> <li>5. Create applications using a state machine design platform.</li> <li>6. Explore use of graphs and charts and build a user interface.</li> </ol>
28.	17ECU613B	Verilog And FPGA Based System Design - Practical	<ol style="list-style-type: none"> <li>1. Understand the feedback topologies involved in the amplifiers.</li> <li>2. Create, synthesize and simulate various digital circuits.</li> </ol>

			<ol style="list-style-type: none"><li>3. Design and model digital circuits with verilog HDL at behavioural, structural and RTL levels.</li><li>4. Develop test benches to stimulate combinational and sequential circuits.</li><li>5. Design the combinational and sequential digital circuits by Verilog HDL</li><li>6. Analyse the frequency response of different configurations of a amplifier</li></ol>
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Name of the Department: **Management**

Course: BBA

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	17BAU501A	Investment Analysis and Portfolio Management	<ol style="list-style-type: none"><li>1. Understand the determinants and behaviour of asset prices,</li><li>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.</li><li>3. Characterize the implications of the market efficiency evidence on active portfolio management</li><li>4. Analyse the EIC framework make decisions based on investing in different avenues.</li><li>5. Critically evaluate the risk return parameters and select the best alternative.</li><li>6. Communicate in written form and prepare report</li></ol>
2.	17BAU501B	Investment Banking and Financial Services	<ol style="list-style-type: none"><li>1. Understand the General structure of various institutional structure</li><li>2. Develop and employ theoretical valuation methods to price these financial instruments.</li><li>3. Exhibit the importance of credit rating agency</li><li>4. Apply financial concepts, theories and tools in financial decision making</li><li>5. Evaluate the legal, ethical and economic environment related to financial services.</li><li>6. Acquire the skills necessary to participate in managing a financial services company</li></ol>
3.	17BAU502A	Advertising and Brand Management	<ol style="list-style-type: none"><li>1. Analyze advertising and branding techniques and apply them to a variety of different issues;</li><li>2. In calculate and prepare presentations on advertising and brand management issues.</li><li>3. Examine knowledge in development and management of customer-based brand equity.</li><li>4. Examine <i>advertising</i> and its functions in relation to <i>brand</i> success</li><li>5. Evaluate the criteria for the best advertisements and brands and apply in lifelong practice.</li><li>6. Work in teams and exhibit leadership skills.</li></ol>
4.	17BAU502B	Retail Management	<ol style="list-style-type: none"><li>1. Assess the understand the ways that retailers use marketing tools and techniques.</li><li>2. Develop an in-depth understanding of <i>retail</i> and services management as well as non-store retailing</li><li>3. Use foundational skills knowledge to remain current with marketing and management strategies and trends and employ them in new business environments.</li><li>4. Understand the functions of retail business and various retail formats and retail channels.</li></ol>

			<ol style="list-style-type: none"> <li>5. Exhibit the knowledge of design, implementation, and assessment of retailing strategies based on consumer needs.</li> <li>6. Critically analyse and evaluate the criteria for the functioning of the retail store and growth of retail sector in India</li> </ol>
5.	17BAU503A	Taxation - I	<ol style="list-style-type: none"> <li>1. Understand the income tax laws in India and be able to do <i>tax</i> planning.</li> <li>2. Interpret and exhibit the assessment procedure of individuals and computation of tax liability.</li> <li>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</li> <li>4. Comprehend on the assessment of the GST</li> <li>5. Communicate orally and in written form the income tax, GST and customs law and computations of IT.</li> <li>6. Understand with the laws pertaining to the Income Tax and apply it lifelong.</li> </ol>
6.	17BAU503B	Company Law and Secretarial Practice	<ol style="list-style-type: none"> <li>1. Understand the companies requirements as a company secretary</li> <li>2. Practices according to the law in companies</li> <li>3. Exhibit the importance of company secretary in formation of a company</li> <li>4. Develop the knowledge about the concept and procedures of <i>secretarial practice</i></li> <li>5. Understand the role and functions of the <i>company secretary</i></li> <li>6. Gain knowledge on formation of company, documents required and Acts pertaining to it.</li> </ol>
7.	17BAU504A	Entrepreneurship Development	<ol style="list-style-type: none"> <li>1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.</li> <li>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.</li> <li>3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.</li> <li>4. Exhibit with the skills of entrepreneur</li> <li>5. Preparation and evaluation of business plan and Project formulations</li> <li>6. Develop and implement advanced knowledge and skills of project and programme management in establishing a new enterprise.</li> </ol>
8.	17BAU504B	Production and Operations Management	<ol style="list-style-type: none"> <li>1. Analyze the entire process of manufacturing a product or a service</li> <li>2. Understand the concept of optimum utilization of resources and minimization of cost</li> </ol>

			<ol style="list-style-type: none"> <li>3. Exhibit and Understand the materials management, concept of inventory and quality control.</li> <li>4. Critically evaluate the project completion cycle using operation techniques and solve the problem.</li> <li>5. formulate the production planning and control systems and ensure efficient scheduling for production</li> <li>6. Obtain the knowledge of applying a quality management TQM tools to improve organizational effectiveness.</li> </ol>
9.	17BAU601A	HRD: Systems and Strategies	<ol style="list-style-type: none"> <li>1. Exhibit the role of and effectiveness of HR</li> <li>2. Understand the emerging trends in HRD</li> <li>3. Analyze the HR experiences in India</li> <li>4. Collaborate with others, in the development, implementation, and evaluation of organizational and health and safety policies and practices.</li> <li>5. Research and analyze information needs and apply current and emerging information technologies to support the human resources function.</li> <li>6. Develop, implement, and evaluate organizational development strategies aimed at promoting organizational effectiveness.</li> </ol>
10.	17BAU601B	Management of Industrial Relations	<ol style="list-style-type: none"> <li>1. Demonstrate descriptive knowledge of the field of industrial relations.</li> <li>2. Apply the essential concepts of industrial relations and their interrelationship at the personal, organizational and national levels.</li> <li>3. Investigate solutions to industrial relations and labour problems based on legal code.</li> <li>4. Communicate your knowledge of industrial relations in both written and verbal formats.</li> <li>5. Understand critique the concept of employee engagement</li> <li>6. Developing role of human resources in the global arena</li> </ol>
11.	17BAU602A	Global Business Environment	<ol style="list-style-type: none"> <li>1. Infer knowledge on economic environment</li> <li>2. Access the trends in sustainable development</li> <li>3. Exhibit in various trade policy</li> <li>4. Understand the knowledge of Indian policy</li> <li>5. Assess issues in Indian Economy</li> <li>6. Understand the concept of WTO and IMF</li> </ol>
12.	17BAU602B	International Trade Policy and Strategy	<ol style="list-style-type: none"> <li>1. Infer knowledge on fundamentals of trade theory and its application to policy.</li> <li>2. Examine international trade laws and regulations</li> <li>3. Analyse the trends in Indian Export and Import.</li> <li>4. Understand the Concept of Export, EXIM strategies, custom clearance and Export incentive schemes.</li> <li>5. Communicate orally and in written form the understanding of Export, EXIM strategies, custom clearance and Export incentive schemes.</li> </ol>

			6. Apply the understanding of Export, EXIM strategies, custom clearance and Export incentive schemes.
13.	17BAU603A	Taxation - II	<ol style="list-style-type: none"> <li>1. Interpret the concepts in central sales tax and VAT</li> <li>2. Computation of taxation with procedures</li> <li>3. Infer knowledge in central and customs act</li> <li>4. Analyse and evaluate the effect of an indirect <i>tax</i> on consumers and producers.</li> <li>5. Gain expert knowledge of the principles of the indirect tax laws and the relevant rules.</li> <li>6. Understand various concepts of Goods &amp; Service Tax</li> </ol>
14.	17BAU603B	Strategic Management	<ol style="list-style-type: none"> <li>1. Understand the strategic decisions that organisations make and have an ability to engage in strategic planning.</li> <li>2. Exhibit the strategic management practices used by top management</li> <li>3. Analyze the matrix in strategic management</li> <li>4. Impart and implement strategic principles and practice</li> <li>5. Exhibit the basic concepts, principles and practices associated with strategy formulation and implementation</li> <li>6. Understand the principles of strategy formulation, implementation and control in organizations</li> </ol>
15.	17BAU691	Project	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</li> <li>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</li> <li>4. Apply the theoretical and practical learning of doing research into lifelong practice.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Work in team and exhibit leadership skills</li> </ol>
16.	18ENU301	English – III	<ol style="list-style-type: none"> <li>1. Students learnt the basics and purposes of listening skill.</li> <li>2. Students will know the importance of speaking.</li> <li>3. Students developed the speaking skills on telephone, business and also in travel</li> <li>4. Learnt some effective vocabulary learning strategies.</li> <li>5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.</li> <li>6. Students will have honed the skills of communication which is needed for business purpose.</li> </ol>
17.	18BAU301	Principles of Marketing	<ol style="list-style-type: none"> <li>1. Understand the Concept of marketing, and 4Ps of Marketing</li> </ol>

			<ol style="list-style-type: none"> <li>2. Access marketing process and segmentation</li> <li>3. Apply the marketing concepts and skills lifelong.</li> <li>4. Demonstrate the product management and brand identification</li> <li>5. Understand the pricing and distribution management</li> <li>6. Evaluate the growth of online and direct marketing</li> </ol>
18.	18BAU302	Management Accounting	<ol style="list-style-type: none"> <li>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</li> <li>2. Comprehend on the contemporary issues relevant to accounting concepts.</li> <li>3. Analyse the alternatives using appropriate tools and techniques.</li> <li>4. Solve the problems and take decisions based on the result.</li> <li>5. Communicate orally and in written form the concepts and solutions.</li> <li>6. Analyse the financial statement analysis using ratios, fund flow and cash flow statements.</li> </ol>
19.	18BAU303A	Human Resource Management	<ol style="list-style-type: none"> <li>1. Understand the Concept of Human Resource Management, Human Resource Planning, Recruitment, performance appraisal and employee relations.</li> <li>2. Communicate orally and in written form the understanding of Human Resource Management, Human Resource Planning, Recruitment, performance appraisal and employee relations.</li> <li>3. Apply the understanding of Human Resource Management, Human Resource Planning, Recruitment, performance appraisal and employee relations in lifelong practice.</li> <li>4. Assess the job analysis for a profile and understand its linkage with HR planning</li> <li>5. Evaluate the training needs and draft a training programme.</li> <li>6. Differentiate the Domestic and International HRM in a global perspective</li> </ol>
20.	18BAU303B	Management Information System	<ol style="list-style-type: none"> <li>1. Understand the usage of information system in management decision.</li> <li>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision</li> <li>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</li> <li>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</li> <li>5. Apply the understanding of the usage of information system in management decision as a lifelong practice.</li> <li>6. Demonstrate the support models and knowledge management.</li> </ol>
21.	18BAU311	Principles of Marketing	<ol style="list-style-type: none"> <li>1. Apply the concept of the marketing in own business concerns</li> </ol>

		(Practical)	<ol style="list-style-type: none"> <li>2. Evaluate the case studies on pros and cons to avoid the critical situations.</li> <li>3. Evaluate the appropriate alternatives and draw a solution.</li> <li>4. Access the advantages and disadvantages of online marketing</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Demonstrate the distribution management or the selected company.</li> </ol>
22.	18BAU312	Management Accounting (Practical)	<ol style="list-style-type: none"> <li>1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.</li> <li>2. Comprehend on the contemporary issues relevant to accounting concepts.</li> <li>3. Analyse the alternatives using appropriate tools and techniques.</li> <li>4. Solve the problems and take decisions based on the result.</li> <li>5. Communicate orally and in written form the concepts and solutions.</li> <li>7. Understand the importance to prepare budget and apply the controlling mechanisms</li> </ol>
23.	18BAU313A	Human Resource Management (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the Human resource management and HR practices in real organization.</li> <li>2. Analyse the case studies, HR process and apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives methods for HR practices and select the best methods suiting the situation.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Evaluate the reasons for grievances and able to draw a solution</li> </ol>
24.	18BAU313B	Management Information System (Practical)	<ol style="list-style-type: none"> <li>1. Understand the usage of information system in management decision.</li> <li>2. Critically analyse and evaluate the use of DSS, AI in supporting management decision</li> <li>3. Communicate orally and in written form the understanding of the usage of information system in management decision.</li> <li>4. Understand the security and ethical issues pertaining to use of information technology in management decision making.</li> <li>5. Apply the understanding of the usage of information system in management decision lifelong practice.</li> <li>6. Evaluate the performance of E - Governance in a state.</li> </ol>
25.	18ENU401	English – IV	<ol style="list-style-type: none"> <li>1. Students have acquired proficiency in communication.</li> <li>2. Students have become adept in written communication and presentation skills.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Practice the skill of writing in English and that of public speaking.</li> <li>4. Establish and maintain social relationships.</li> <li>5. Develop communication skills in business environment.</li> <li>6. Refine communication competency through LSRW skills.</li> </ol>
26.	18BAU401	Business Research Methods	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>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.</li> <li>3. Critically formulate the research design and sampling design suitable for the problem.</li> <li>4. Communicate orally and written for the research problem, research design, sampling techniques.</li> <li>5. Design a report to communicate the findings and suggestion to make business decision</li> <li>6. Apply the statistical tools for analysis and interpret</li> </ol>
27.	18BAU402	Financial Management	<ol style="list-style-type: none"> <li>1. Apply the Concept of financial management by effective use of working capital</li> <li>2. Analyse the capital budgeting decisions using appropriate tools and techniques.</li> <li>3. Assess the different leverage and dividend policies.</li> <li>4. Communicate orally and in written form the concepts and solutions.</li> <li>5. Analyse cases in a team and exhibit leadership skills.</li> <li>6. Understand the concept of capital structure and cost of capital</li> </ol>
28.	18BAU403A	Financial Analysis and Reporting	<ol style="list-style-type: none"> <li>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</li> <li>2. Understand and examine tools and techniques to analyse the financial statement analysis.</li> <li>3. Evaluate the results of the tools applied, interpret the result.</li> <li>4. Access the financial statement with the use ratio analysis and interpret the results.</li> <li>5. Recognize the uses and importance of financial statement</li> <li>6. Measure the financial ratios to meet the corporate objectives</li> </ol>
29.	18BAU403B	Decision making using SPSS	<ol style="list-style-type: none"> <li>1. To understand the Importance of SPSS and the features for in SPSS</li> <li>2. To apply descriptive analytical tools available in SPSS and its appropriate application and interpretation.</li> <li>3. To examine the univariate tools available in SPSS and its appropriate application and interpretation.</li> </ol>

			<ol style="list-style-type: none"> <li>4. To use the parametric and non-parametric tools available and its appropriate application and interpretation.</li> <li>5. To understand the multivariate analysis tools available in SPSS.</li> <li>6. To communicate orally and in written form the understanding of SPSS and its features</li> </ol>
30.	18BAU411	Business Research Methods (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend the meaning of research, theory of induction, deduction, research process, research design, sampling techniques, hypothesis writing and report writing</li> <li>2. Analyse the research problem and design the instruments to capture data</li> <li>3. Access the sampling design using appropriate statistical techniques, and apply the learning lifelong.</li> <li>4. Evaluate the appropriate scales and measurement to be used for capturing data.</li> <li>5. Design a report to communicate the findings and suggestion to make business decision</li> <li>6. Apply the statistical tools for analysis and interpret</li> </ol>
31.	18BAU412A	Financial Analysis and Reporting (Practical)	<ol style="list-style-type: none"> <li>1. Comprehend the Concept of Financial reporting standards, difference between IFRS and IAS and the users of the financial statements for the decision making.</li> <li>2. Understand and examine tools and techniques to analyse the financial statement analysis.</li> <li>3. Evaluate the results of the tools applied, interpret the result.</li> <li>4. Access the financial statement with the use ratio analysis and interpret the results.</li> <li>5. Recognize the uses and importance of financial statement</li> <li>6. Measure the financial ratios to meet the corporate objectives</li> </ol>
32.	18BAU412B	Decision making using SPSS (Practical)	<ol style="list-style-type: none"> <li>1. Create datasheet and enter the data</li> <li>2. Compute descriptive statistics using the package and graphically represent the data.</li> <li>3. Perform univariate and bivariate analysis in the software package.</li> <li>4. Perform multivariate analysis in the software package.</li> <li>5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.</li> <li>6. To understand the Importance of SPSS and the features for in SPSS</li> </ol>
33.	19LAU101	Language - I	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய</li> </ol>

			<p>ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</p> <p>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</p> <p>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</p> <p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
34.	19ENU101	English – I	<ol style="list-style-type: none"> <li>1. Develop the knowledge of interpersonal skills.</li> <li>2. Establish and maintain social relationships.</li> <li>3. Genres of literature will give moral values of life.</li> <li>4. Develop communication skills in business environment</li> <li>5. Communication skills will get developed.</li> <li>6. Develop to have language competence</li> </ol>
35.	19BAU101	Fundamentals of Management and Organizational Behaviour	<ol style="list-style-type: none"> <li>1. Understand the concepts of management and the functions of management.</li> <li>2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.</li> <li>3. Assess the impact of the personality traits and their perception in day to day performance.</li> <li>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.</li> <li>5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</li> <li>6. Exhibit the changes in organization and tactics in managing conflict</li> </ol>
36.	19BAU102	Business Accounting	<ol style="list-style-type: none"> <li>1. Comprehend the accounting concepts, principles and to comply the accounting standards.</li> <li>2. Understand the difference between capital and revenue expenditure.</li> <li>3. Prepare the final accounts.</li> <li>4. Calculate the asset depreciation using different methods</li> <li>5. Evaluate the inventory value using different methods.</li> <li>6. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the accounting discipline.</li> </ol>
37.	19AEC101	Business Communication	<ol style="list-style-type: none"> <li>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</li> <li>2. Draft business correspondence for the organization requirement.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Prepare business reports for organization needs and use appropriate technology for business communication.</li> <li>4. Draft the resume and develop skills to face the interview</li> <li>5. Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</li> <li>6. Understand the essential of usage of technology</li> </ol>
38.	19BAU111	Fundamentals of Management and Organizational Behaviour (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concepts of management and the functions of management.</li> <li>2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.</li> <li>3. Assess the impact of the personality traits and their perception in day to day performance.</li> <li>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.</li> <li>5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</li> <li>7. Exhibit the changes in organization and tactics in managing conflict</li> </ol>
39.	19BAU112	Financial software package (Practical)	<ol style="list-style-type: none"> <li>1. Understand the different accounting heads and its importance</li> <li>2. Create vouchers by understanding the reason for posting under different heads</li> <li>3. Calculate valuation of assets using the software</li> <li>4. Prepare the financial statements and retrieve ratios</li> <li>5. Creating backup and ensuring the accuracy of the accounting data</li> <li>6. Communicate the output derived.</li> </ol>
40.	19LAU201	Language – II	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> <li>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li> <li>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li> <li>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li> </ol>
41.	19ENU201	English – II	<ol style="list-style-type: none"> <li>1. Learn to enjoy the ecstasy of literature.</li> </ol>

			<ol style="list-style-type: none"> <li>2. The select literary pieces will develop the confidence level of the learners.</li> <li>3. To get the social values.</li> <li>4. To know the importance of communication</li> <li>5. Get sound knowledge in English</li> <li>6. Trained to communicate well for business purpose.</li> </ol>
42.	19BAU201	Managerial Economics	<ol style="list-style-type: none"> <li>1. Apply the demand and supply concept in managerial decisions</li> <li>2. Calculate the Cost, Revenue and breakeven point and apply it in decision making process.</li> <li>3. Formulate the pricing strategies based on the market structure.</li> <li>4. 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.</li> <li>5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills.</li> <li>6. Understand the functions of commercial bank and theories of interest.</li> </ol>
43.	19BAU202	Business Mathematics and Statistics	<ol style="list-style-type: none"> <li>1. Apply the demand and supply concept in managerial decisions</li> <li>2. Calculate the Cost, Revenue and breakeven point and apply it in decision making process.</li> <li>3. Formulate the pricing strategies based on the market structure.</li> <li>4. 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.</li> <li>5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills.</li> <li>6. Understand the functions of commercial bank and theories of interest.</li> </ol>
44.	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing</li> </ol>

			<p>them, including interactions across local to global scales.</p> <ol style="list-style-type: none"> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> <li>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.</li> </ol>
45.	19BAU211	Managerial Economics (Practical)	<ol style="list-style-type: none"> <li>1. Understand the concept of the micro and macroeconomic concepts and its application in business</li> <li>2. Analyse the case studies and try to apply the theoretical learning into lifelong practice.</li> <li>3. Critically evaluate the appropriate alternatives and draw a solution.</li> <li>4. Communicate in oral and written form and prepare report</li> <li>5. Work in team and exhibit leadership skills</li> <li>6. Analysis the cost and revenue function based on the cost of production</li> </ol>

Name of the Department: **Management**

**Course: MBA**

<b>Sl. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Course Outcomes</b>
1.	19MBAP101	Fundamental of Management and Organizational Behaviour	<ol style="list-style-type: none"><li>1. Understand the concepts of management and the functions of management.</li><li>2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.</li><li>3. Assess the impact of the personality traits and their perception in day to day performance.</li><li>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.</li><li>5. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.</li><li>6. Understand the management function and roles of the manager and become an effective planner and decision maker</li></ol>
2.	19MBAP102	Business Communication	<ol style="list-style-type: none"><li>1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.</li><li>2. Draft business correspondence for the organization requirement.</li><li>3. Prepare business reports for organization needs.</li><li>4. Use appropriate technology for business communication.</li><li>5. Draft the resume and develop the skills to face the interview</li><li>6. Understand the concept of Group Discussions and Interviews</li></ol>
3.	19MBAP103	Managerial Economics	<ol style="list-style-type: none"><li>1. Apply the economic way of thinking to individual decisions and business decisions</li><li>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,</li><li>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</li><li>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.</li><li>5. Understand and exhibit the communication skills to convey the thoughts and ideas of case analysis to the individuals and group.</li><li>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.</li></ol>
4.	19MBAP104	Legal Aspects of Business	<ol style="list-style-type: none"><li>1. Analyze the nature of contract law, Company law and cyber laws and its application in business.</li><li>2. Assess the legal forms of business organization and its</li></ol>

			<p>modus operandi.</p> <ol style="list-style-type: none"> <li>3. Recognize the application appropriate regulations of factories act and wages act in business scenario.</li> <li>4. Understand and apply the concept and laws pertaining to income tax and sales tax, intellectual property rights and cyber laws and evaluate its impact on business and social environment.</li> <li>5. Effectively communicate ideas, explain procedures in oral and written forms to different audiences.</li> <li>6. Illustrate the consumer legislations towards consumer protection and Environment protection</li> </ol>
5.	19MBAP105	Accounting for Managers	<ol style="list-style-type: none"> <li>1. Understand the accounting standards and realize the difference in the GAAP and IFRS.</li> <li>2. Ability to prepare, read, interpret and analyse financial statements to assess the financial performance and position of accompany;</li> <li>3. Understand and apply cost concepts to analyse common business management decisions such as pricing and outsourcing decisions from a financial perspective;</li> <li>4. Understand the importance and application of budgeting in organizational planning and control.</li> <li>5. Explain how financial transactions are processed through the accounting information system each accounting period</li> <li>6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the accounting decisions.</li> </ol>
6.	19MBAP106	Statistics for Decision Making	<ol style="list-style-type: none"> <li>1. Understand the basic statistical tools and techniques and its application in business decision-making.</li> <li>2. Perform basic statistical estimation and hypothesis testing for interpret the results.</li> <li>3. Know how to specify, estimate, and use statistical models to predict and obtain reliable forecasts.</li> <li>4. Develop an ability to analyse and interpret the collected data to provide meaningful information in making management decisions</li> <li>5. Develop skills to design business model and Analytics projects</li> <li>6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the discipline of statistics.</li> </ol>
7.	19MBAP111	MS Office and Tally (Practical)	<ol style="list-style-type: none"> <li>1. Create new word documents using inbuilt features like tables, charts and references.</li> <li>2. Create a datasheet from collected data and analyses the data using inbuilt functions and tools.</li> <li>3. Design a presentation using animation, special effects and graphics.</li> <li>4. Utilize the Internet Web resources for communication.</li> <li>5. Create the vouchers and prepare the company's final account and reports.</li> <li>6. Stimulate their Critical thinking by designing and developing clean and lucid writing skills.</li> </ol>
8.	19MBAP112	Case Analysis and Presentation	<ol style="list-style-type: none"> <li>1. Understand the utilization of SWOT tools in analyzing the situation</li> <li>2. Develop the analytical and critical thinking skills</li> </ol>

			<ol style="list-style-type: none"> <li>3. Work with teams to bring out the solution.</li> <li>4. Communicate the collected case facts and analysis orally with support of visual aids</li> <li>5. Enact the scenario and convince the solution derived.</li> <li>6. Understand Present relevant information about the company and the industry</li> </ol>
9.	18MBAP301	Corporate Strategy	<ol style="list-style-type: none"> <li>1. Demonstrate a critical understanding of strategic management theories and apply lifelong.</li> <li>2. Apply quantitative and qualitative tools to evaluate and control</li> <li>3. Formulate appropriate strategies for companies.</li> <li>4. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills</li> <li>5. Communicate effectively strategic evaluation and control techniques</li> <li>6. Understand the concept of Quantitative and Qualitative tools in Strategy Evaluation and Control</li> </ol>
10.	18MBAP302	International Business	<ol style="list-style-type: none"> <li>1. Comprehend the concepts of International business, trade procedures and Exim Policy apply lifelong</li> <li>2. Understand the basics of shipment, foreign trade and international agencies and agreement.</li> <li>3. Demonstrate capabilities of analysing problems, team work and communication skills</li> <li>4. Develop knowledge on international financial institutions</li> <li>5. Acquire knowledge on foreign trade.</li> <li>6. Understand Financing of foreign trade and Documentation</li> </ol>
11.	18MBAPF303 A	Investment Analysis and Portfolio Management	<ol style="list-style-type: none"> <li>1. Understand the Concept of investing and mechanics for formulating investment decisions.</li> <li>2. Apply the investing concepts and skills lifelong.</li> <li>3. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills</li> <li>4. Demonstrate knowledge and compute value of security analysis &amp; portfolio management and apply the concept to Evaluate the business proposal applying capital budgeting techniques</li> <li>5. Understand about SAPM. Investments', its types, risk involved in investments', analysis pertaining to investments, Portfolio Theory and models on investment management.</li> <li>6. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.</li> </ol>
12.	18MBAPF303 B	Financial Markets and Services	<ol style="list-style-type: none"> <li>1. Understand the features and functioning of the financial markets and financial services operations and apply lifelong.</li> <li>2. Communicate orally and in written form the features and functioning of the financial markets and financial services operations.</li> <li>3. Demonstrate capabilities of analysing problems, team work and communication skills</li> <li>4. To give them an overview about insurance market</li> <li>5. To gain a comprehensive knowledge on the procedural formalities in dealing with different types of customers.</li> </ol>

			6. To understand competent in creating different types of charges and documentation in respect of different types of borrowers against various types of securities
13.	18MBAPF303 C	Project Appraisal and Finance	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of projects, project appraisal, risk management and project management and apply lifelong.</li> <li>2. Perform the feasibility study to decide on the project selection.</li> <li>3. Critically evaluate the projects using financial analysis and risk management tools.</li> <li>4. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills</li> <li>5. Apprehend different level of project appraisal to run the business</li> <li>6. Understand the concept of Performance Audit and Project Leadership</li> </ol>
14.	18MBAPM30 3A	Services Marketing	<ol style="list-style-type: none"> <li>1. Understand the Services, marketing of services, marketing mix, pricing and segmentation for services marketing.</li> <li>2. Comprehend on the consumer behaviour of services sector and emerging issues in services sector.</li> <li>3. Evaluate the Gap in services sector using tools and techniques.</li> <li>4. Demonstrate capabilities of analysing problems, team work and communication skills</li> <li>5. Understand the role of marketing strategic business in service sector</li> <li>6. Gain knowledge on operations and financial aspects in market and retail planning</li> </ol>
15.	18MBAPM30 3B	Integrated Marketing Communication	<ol style="list-style-type: none"> <li>1. Understand the concept of integrated marketing communication, understanding communication process and digital marketing and apply lifelong.</li> <li>2. Develop advertisement by selecting appropriate media.</li> <li>3. Understand the ethical standards related to advertising.</li> <li>4. Demonstrate capabilities of analysing problems, team work and communication skills</li> <li>5. Gain knowledge in Planning and development of creative marcom</li> <li>6. Understand strategies for Digital Media &amp; Advertising.</li> </ol>
16.	18MBAPM30 3C	Retail Management	<ol style="list-style-type: none"> <li>1. Understand the Concept of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing.</li> <li>2. Communicate orally and in written form the understanding of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing.</li> <li>3. Apply the understanding of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing in lifelong practice.</li> <li>4. Demonstrate capabilities of analysing problems, team work and communication skills.</li> <li>5. Explain the concept of strategic planning within the retail management decision process</li> <li>6. To know the various Retail Inventory Planning , Return on Inventory Investments and Stock Turnover</li> </ol>

17.	18MBAPH30 3A	Industrial Relations and Labour Welfare	<ol style="list-style-type: none"> <li>1. Comprehend on industrial relations, industrial conflicts, employee discipline, collective bargaining and industrial safety.</li> <li>2. Apply the legal aspects of industrial relations, industrial conflicts, employee discipline, collective bargaining and industrial safety lifelong.</li> <li>3. Demonstrate capabilities of analysing problems, team work and communication skills.</li> <li>4. Gain knowledge of Industrial safety, Occupational hazards</li> <li>5. Demonstrate knowledge of Statutory welfare measures – Welfare Funds – Education and training schemes</li> <li>6. Know about the Education and training schemes</li> </ol>
18.	18MBAPH30 3B	Compensation and Benefits Management	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of Wages, Salary, incentives, Compensation and pay scale systems and apply lifelong.</li> <li>2. To comprehend on the ethical laws related to compensation management.</li> <li>3. Critically evaluate, select the suitable methods and design the Pay structure.</li> <li>4. Demonstrate capabilities of problem-solving, critical thinking, team work and communication skills</li> <li>5. Understand the Compensation plans provided by Public sectors &amp; Private Sectors</li> <li>6. Get knowledge of Incentives and Retirement plans</li> </ol>
19.	18MBAPH30 3C	Strategic HRM	<ol style="list-style-type: none"> <li>1. Understand the transformation in the role of HR functions from being a support function to strategic function and apply lifelong.</li> <li>2. Explore the relationship between the management of people and pursuit of an organisations strategic goals and objectives.</li> <li>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.</li> <li>4. Understand and apply the appropriate employee relations measures and strategic HRM Concept</li> <li>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</li> <li>6. Gain knowledge in reward strategy and employee relations strategy</li> </ol>
20.	18MBAPS303 A	Enterprise Resource Planning	<ol style="list-style-type: none"> <li>1. Understand the concept of Enterprise Resource Planning (ERP), ERP related technologies, its implementation, module structures of ERP, ERP vendors role, future trends in ERP and apply the learnings lifelong.</li> <li>2. Evaluate the need of ERP for an organization, select the best vendor and implement the module that is appropriate for the organization need.</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Apprehend application of different Sales and Distribution tools for business.</li> <li>5. Know the Business benefits of ES</li> <li>6. Understand the concept of Data definition language</li> </ol>
21.	18MBAPS303 B	Managing Software Projects	<ol style="list-style-type: none"> <li>1. Understand the concept of software development, software project planning, estimation, scheduling, monitoring, quality assurance and software reengineering and apply learning lifelong.</li> <li>2. Apply appropriate tools and techniques to evaluate the project cost.</li> <li>3. Utilize problem solving techniques to schedule the project.</li> <li>4. Apply software testing methods and tools to ensure software quality.</li> <li>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.</li> <li>6. Produce quantitative analysis using specialist software</li> </ol>
22.	18MBAPS303 C	E-Commerce	<ol style="list-style-type: none"> <li>1. Understand the concept of ecommerce, infrastructure, ecommerce models, risk, e-payment, and e marketing and apply learning lifelong.</li> <li>2. Comprehend on the legal aspects related to e-commerce.</li> <li>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.</li> <li>4. Explore the wealth of online learning environment and adopt methods for system online implementation.</li> <li>5. Acquitted with the recent trends and developments in technology which covers e-Commerce and knowledge management aspects.</li> <li>6. Understand E-Marketing, Customer orientation and Future of Ecommerce</li> </ol>
23.	18MBAPE303 A	Technology Management and Intellectual Property Rights	<ol style="list-style-type: none"> <li>1. Understand the concept of Technology management, Technology Adoption, Diffusion, Absorption , development and transfer and apply learning lifelong.</li> <li>2. Comprehend on the intellectual property rights.</li> <li>3. Apply the understanding of intellectual property rights.</li> <li>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.</li> <li>5. Identify and evaluate opportunities for new technologies</li> <li>6. Understand the basics of the four primary forms of intellectual property rights.</li> </ol>
24.	18MBAPE303 B	Social Entrepreneurship	<ol style="list-style-type: none"> <li>1. Understand the social entrepreneurship, scanning opportunity for social entrepreneurship, business models, social innovation and apply learning lifelong.</li> <li>2. Analyse the real cases of social entrepreneurship and understand the dynamics of social entrepreneurship.</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Generate innovative ideas and find ways to apply these ideas to solve issues and problems in different industries and settings.</li> <li>5. Analyze the role of government in business</li> <li>6. Maintain ethical standards in individual and business life</li> </ol>
25.	18MBAPE303 C	Venture Capital and Private Equity	<ol style="list-style-type: none"> <li>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.</li> <li>2. Evaluate and select the best alternative applying the valuation models.</li> <li>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.</li> <li>4. Understand Strategies of Private Equity</li> <li>5. Gain knowledge in Valuation approaches</li> <li>6. Evaluate Exit strategies for Private Equity</li> </ol>
26.	18MBAPB303 A	Planning, Structuring, and Financing Small Business	<ol style="list-style-type: none"> <li>1. Understand the characteristic and problems of Small business.</li> <li>2. Comprehend on the government initiative for the small business, Institutional support and schemes available for the support of small scale industry.</li> <li>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.</li> <li>4. Demonstrate knowledge on the ways of Development bank and regulators support for small business</li> <li>5. Apprehend different level of Institutional Support Schemes to run the business</li> <li>6. Maintain ethical standards in individual and business life</li> </ol>
27.	18MBAPB303 B	Finance and Accounting for Small Business:	<ol style="list-style-type: none"> <li>1. Understand the concept of bookkeeping, budgeting, capital budgeting, financing options and financial analysis tools and apply the learning lifelong in small business operations.</li> <li>2. Select the appropriate tools and techniques and solve problems to select the best alternative.</li> <li>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.</li> <li>4. Apprehend application of Basic Control Systems</li> <li>5. Know the Business benefits of Zero Working Capital and Zero Fixed Assets</li> <li>6. Understand the concept of Performance Measurement Systems</li> </ol>
28.	18MBAPB303 C	Marketing for Small Business	<ol style="list-style-type: none"> <li>1. To Understand the concept of scanning marketing environment, product mix, pricing, promotion and place and apply the learning lifelong in small business.</li> <li>2. To select the appropriate product mix, formulate the best pricing, promotion strategies for the chosen small business target segment.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group</li> </ol>

			<p>leadership, oral and written communication, critical thinking, analysing, planning and team work.</p> <ol style="list-style-type: none"> <li>4. Understanding the Promotion and Distribution Strategies</li> <li>5. Analyse Emerging marketing environment in India.</li> <li>6. Understand Rural Marketing, Marketing Research concepts and Techniques</li> </ol>
29.	18MBAPA30 3A	Data Mining and Data warehousing	<ol style="list-style-type: none"> <li>1. Understand the basic principles, concepts and applications of data warehousing and data mining,</li> <li>2. Comprehend the importance of Processing raw data to make it suitable for various data mining algorithms.</li> <li>3. Visualize the techniques of clustering, classification, association finding, feature selection and its importance in analysing the real-world data.</li> <li>4. Understand the Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment</li> <li>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.</li> <li>6. Understand Preliminary analysis of the data set using traditional query tools</li> </ol>
30.	18MBAPA30 3B	Data Visualization for Managers – Using R and Tableau	<ol style="list-style-type: none"> <li>1. Understand the basics of data visualization</li> <li>2. Design visualizations that represent the relationships contained in complex data sets and adapt them to highlight the ideas you want to communicate.</li> <li>3. Formulate and use appropriate models of data analysis to answer business-related questions.</li> <li>4. Interpret data findings effectively to any audience, orally, visually and in written formats.</li> <li>5. Learn to use colors, shapes, and other tools to dig deep into data</li> <li>6. Create Maps &amp; How to build interactive web pages</li> </ol>
31.	18MBAPA30 3C	Machine Language	<ol style="list-style-type: none"> <li>1. Understand the basics of machine language</li> <li>2. Apply the predictive analytics modeling</li> <li>3. Evaluate the best decisions applying the basic probabilistic, supervised learning, unsupervised learning and deep learning</li> <li>4. Formulate and use appropriate models of data analysis to answer business-related questions.</li> <li>5. Interpret and communicate data findings effectively to any audience, orally, visually and in written formats.</li> <li>6. Gain knowledge in Automate Feature Extraction using Deep Learning</li> </ol>
32.	18MBAPI303 A	International Economics	<ol style="list-style-type: none"> <li>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.</li> <li>2. Gain the knowledge and analyze the emerging global trends in business environment.</li> <li>3. Develop insight on exchange of exports and imports</li> <li>4. Analyze the impact of exchange rate fluctuation on home currencies</li> </ol>

			<ol style="list-style-type: none"> <li>5. Evaluate the policies pursued by various economic bodies in international trade</li> <li>6. Get familiarize with the export promotion measures and their benefits to their business</li> </ol>
33.	18MBAPI303 B	International Trade procedures and Documentation	<ol style="list-style-type: none"> <li>1. Understand the Concept of Export, EXIM strategies, custom clearance and Export incentive schemes.</li> <li>2. Communicate orally and in written form the understanding of Export, EXIM strategies, custom clearance and Export incentive schemes.</li> <li>3. Apply the understanding of Export, EXIM strategies, custom clearance and Export incentive schemes.</li> <li>4. Gain the knowledge on value of international trade relations to outsource their business</li> <li>5. Students know about the value of trade of their economies and other economies</li> <li>6. Understand Information Technology in International Business</li> </ol>
34.	18MBAPI303 C	International Logistics Management	<ol style="list-style-type: none"> <li>1. Comprehend on the basic components of International Logistics and integrating all the subsystems of Logistics</li> <li>2. Understand the various processes involved in International Trade and the various types of Marketing Channels and its role in Logistics.</li> <li>3. Know the Concept of Multimodal transportation, their legal classifications, Characteristics and the choice of transport.</li> <li>4. Comprehend the basic concepts of Containerisation and Chartering.</li> <li>5. Understand the Inventory management, Packaging and various kinds of packing.</li> <li>6. Apply the understanding of basic components of International Logistics and integrating all the subsystems of Logistics lifelong.</li> </ol>
35.	18MBAPO30 3A	Supply Chain Management	<ol style="list-style-type: none"> <li>1. Understand the concept of supply chain, inventory management, supply contracts, supply chain integration and global logistics.</li> <li>2. Apply the understanding of supply chain, inventory management, supply contracts, supply chain integration and global logistics lifelong.</li> <li>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.</li> <li>4. Understand the importance of accurate planning and product data management as a part of Logistics Management.</li> <li>5. Familiarize the key drivers of Logistics outsourcing.</li> <li>6. Get an in-depth knowledge in Transactional Logistics</li> </ol>
36.	18MBAPO30 3B	Operations Strategy	<ol style="list-style-type: none"> <li>1. Understand the concept of operations, capacity, purchase, inventory and linkages to strategic formulation, implementation, monitoring and control.</li> <li>2. Apply the understanding of concept of operations, capacity, purchase, inventory and linkages to strategic formulation, implementation, monitoring and control lifelong.</li> </ol>

			<ol style="list-style-type: none"> <li>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.</li> <li>4. Understand the principles and techniques of Operations Research and their applications</li> <li>5. Understand why Capacity strategy and Purchasing and supply strategy</li> <li>6. Understand the importance of Formulation and implementation strategy.</li> </ol>
37.	18MBAPO30 3C	Total Quality management	<ol style="list-style-type: none"> <li>1. Obtain the knowledge of applying a quality management TQM tools to improve organizational effectiveness.</li> <li>2. Acquire required diagnostic skills and use various quality tools.</li> <li>3. Get exposure on tools and techniques like six sigma, 7 old quality control</li> <li>4. Familiarize about the Quality Management System.</li> <li>5. Apply the Quality tools and techniques in improving the performance.</li> <li>6. Understand the concept of quality management (QM), QM Principles, tools and techniques and quality systems.</li> </ol>
38.	18MBAPT303 A	Tourism Principles, Policies and Practices	<ol style="list-style-type: none"> <li>1. Comprehend on the potential of tourism industry in India;</li> <li>2. Understand the various elements of Tourism Management;</li> <li>3. Familiarize with the Tourism policies in the national and international context.</li> <li>4. Apply the knowledge of tourism principles, policies and practices lifelong.</li> <li>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.</li> <li>6. Understand Overview of Five Year Plans</li> </ol>
39.	18MBAPT303 B	Tourism Products of India	<ol style="list-style-type: none"> <li>1. Understand the vast Tourist resources of India;</li> <li>2. Conceptualize a tour itinerary based on variety of themes</li> <li>3. Identify and understand the features of emerging tourist destinations all over the world</li> <li>4. Apply the knowledge of tourism resources, importance of tourist destination lifelong.</li> <li>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.</li> <li>6. Understand Emerging Tourism Destinations of India</li> </ol>
40.	18MBAPT303 C	Recreation Management	<ol style="list-style-type: none"> <li>1. Understand the dynamics of recreation products and their significance for tourism industry;</li> <li>2. Comprehend with the theoretical and practical issues of recreation management;</li> <li>3. Understand the marketing trends in recreation.</li> <li>4. Apply the understanding of recreation products, recreation management and marketing recreation lifelong</li> <li>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.</li> </ol>

			6. Gain knowledge in Environmental perspectives on coastal recreation and tourism
41.	18MBAP321	Internship	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.</li> <li>3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.</li> <li>4. Apply the theoretical and practical learning of doing research into lifelong practice.</li> <li>5. Communicate in oral and written form and prepare report</li> <li>6. Understand the concept of organizational study</li> </ol>
42.	19MBAP201	Production and Operations Management	<ol style="list-style-type: none"> <li>1. Understand the core features of the operations and production management function at the operational and strategic levels.</li> <li>2. Evaluate and decide the best plant and factory location and layout.</li> <li>3. Forecast the requirement and make accurate production planning, inventory planning and schedule the production.</li> <li>4. Obtain the knowledge of applying a quality management TQM tools to improve organizational effectiveness.</li> <li>5. Effectively communicate ideas, explain procedures in oral and written forms to different audiences.</li> <li>7. Creating and delivering products &amp; services to customers and improving process &amp; supply chain performance</li> </ol>
43.	19MBAP202	Marketing Management	<ol style="list-style-type: none"> <li>1. Understand the core concepts of marketing and the role of marketing in business and society.</li> <li>2. Perform market analysis and identify the best marketing mix.</li> <li>3. Determine strategies for developing new products and services for the right target segment by conducting marketing research.</li> <li>4. Understand the latest trends in marketing and apply the ethical norms in marketing domain.</li> <li>5. Effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to the team members.</li> <li>8. Analyze the importance of consumer buying motives &amp; consumer behavior, Designing competitive strategies for Leaders</li> </ol>
44.	19MBAP203	Human Resource Management	<ol style="list-style-type: none"> <li>1. Assess the job analysis for a profile and understand its linkage with HR planning</li> <li>2. Evaluate the training needs and draft a training programme.</li> <li>3. Understand the compensation and reward system applicable to the industry based and understand its linkage with performance management</li> <li>4. Understand and apply the appropriate employee relations measures.</li> <li>5. Understand the HR functions and latest developments in the field of HR and effectively communicate ideas,</li> </ol>

			<p>explain procedures and interpret results and solutions in written and oral forms to different audiences.</p> <p>6. Make any manager to identify various activities related to Human Resources, Job involved in HR, Training, Compensation and Labour welfare practices</p>
45.	19MBAP204	Quantitative Techniques	<ol style="list-style-type: none"> <li>1. Understand the principles and techniques of Operations Research and their applications in decision-making.</li> <li>2. Realize and apply mathematical techniques for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.</li> <li>3. Formulate linear programming (LP) models and understand the cost minimization and profit maximization concepts.</li> <li>4. Select the best strategy on the basis of decision criteria under the uncertainty.</li> <li>5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills.</li> <li>6. Understand Dynamic Programming</li> </ol>
46.	19MBAP205	Financial Management	<ol style="list-style-type: none"> <li>1. Understand the role of a financial manager, and their role in taking decisions professionally.</li> <li>2. Demonstrate knowledge and compute value of money over time and apply the concept to Evaluate the business proposal applying capital budgeting techniques</li> <li>3. Compute the cost of capital and financial leverage to estimate the optimal capital structure.</li> <li>4. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.</li> <li>5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions.</li> <li>6. Develop analytical skills which facilitate the financial decision making in business situations</li> </ol>
47.	19MBAP206	Research Methodology for Management	<ol style="list-style-type: none"> <li>1. Assess the best suitable research type and formulate the research objective for the business problem.</li> <li>2. Formulate the suitable research designs and select appropriate sampling techniques for the research.</li> <li>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.</li> <li>4. Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.</li> <li>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.</li> <li>6. Understand Norms for Using Tables, Charts and Diagrams</li> </ol>
48.	19MBAP211	SPSS (Practical)	<ol style="list-style-type: none"> <li>1. Create datasheet and enter the data</li> <li>2. Compute descriptive statistics using the package and graphically represent the data.</li> <li>3. Perform univariate and bivariate analysis in the software package.</li> <li>4. Perform multivariate analysis in the software package.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.</li> <li>6. Do Multivariate analysis</li> </ol>
49.	19MBAP212	Team Building and Leadership skills (Practical)	<ol style="list-style-type: none"> <li>1. Apply facilitative leadership skills to promote team communication, collaboration, and performance.</li> <li>2. Gain Confidence and ability to deal effectively with challenging team situations.</li> <li>3. Ability to use ongoing evaluation and feedback tools to monitor team progress, tools for team problem-solving and goal attainment.</li> <li>4. Utilize teamwork tools that are used to align individuals to be as effective as team members.</li> <li>5. Receive and integrate feedback on decision-making practices, conflict resolution skills, and teamwork behaviors with the support of a team-based coach.</li> <li>6. Manage Conflict in Organization</li> </ol>
50.	18MBAP401	Indian Ethos and Business Ethics	<ol style="list-style-type: none"> <li>1. Understand Indian ethos and values</li> <li>2. Appreciate the concepts of business ethics in leadership</li> <li>3. Analyze and resolve ethical dilemma</li> <li>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.</li> <li>5. Maintain Managing Ethical Dilemma</li> <li>6. Understand ethical issues related to business and good governance necessary for long term survival of business.</li> </ol>
51.	18MBAPF402 A	Banking and Insurance	<ol style="list-style-type: none"> <li>1. Understand the Concept of banking and insurance its history, products and regulatory body.</li> <li>2. Communicate orally and in written form the Concept of banking and insurance its history, products and regulatory body.</li> <li>3. Apply the Concept of banking and insurance, its products in lifelong practice.</li> <li>4. Demonstrate techniques of leasing provides new avenues in business</li> <li>5. Gain familiarity in hire purchase</li> <li>6. Gain knowledge in Tax implication framework for Financial Evaluation and Credit Rating</li> </ol>
52.	18MBAPF402 B	Mergers, Acquisitions and Corporate Restructuring	<ol style="list-style-type: none"> <li>1. Understand the Concept mergers, Demergers, LBO, MBO, JV its valuation and accounting.</li> <li>2. Compute, analyse and evaluate the corporate restructuring decisions and its impact on company.</li> <li>3. Communicate orally and in written form the understanding of mergers, Demergers, LBO, MBO, JV</li> <li>4. Understand the concessions under Income Tax Act for mergers and unwillingness to pay and inability to pay</li> <li>5. Gain knowledge in Valuation and accounting</li> <li>6. Understand Legal and Regulatory Framework of M &amp; A and Post Merger Integration</li> </ol>
53.	18MBAPF402 C	Financial Derivatives	<ol style="list-style-type: none"> <li>1. Understand the concept of derivative, derivative types as a hedging tool and application of derivative in India.</li> <li>2. Apply the understanding of derivative, derivative types as a hedging tool lifelong.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group</li> </ol>

			<p>leadership, oral and written communication, critical thinking, problem solving, planning and team work.</p> <ol style="list-style-type: none"> <li>4. Explain about concepts of Bonds, Derivatives, Futures and Options management pertaining to investments</li> <li>5. Gain knowledge in Clearing, settlement and risk management in commodity trading.</li> <li>6. Gain knowledge in Emerging Structure of Derivatives Markets in India</li> </ol>
54.	18MBAPF402 D	Financial Econometrics	<ol style="list-style-type: none"> <li>1. Understand the concept of econometrics and econometric modeling and apply it lifelong.</li> <li>2. Comprehend on the tools and techniques and apply the same for modeling the financial data.</li> <li>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.</li> <li>4. Gain knowledge in Functional forms of regression models</li> <li>5. Understand Detection techniques and remedial measures in Multicollinearity</li> <li>6. Understand Model selection criteria</li> </ol>
55.	18MBAPM40 2A	New Product Development	<ol style="list-style-type: none"> <li>1. To understand the concept of new product development process and apply it lifelong.</li> <li>2. To comprehend on the idea creation, development and testing techniques.</li> <li>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.</li> <li>4. Assess alternative business models</li> <li>5. Analyze the market, the competition and the buying behavior of consumers</li> <li>6. Understand Pricing Strategies and Testing of New Products</li> </ol>
56.	18MBAPM40 2B	Consumer Behaviour	<ol style="list-style-type: none"> <li>1. Understand the importance of Culture, Subculture, Social Class, Reference Groups and Family Influences in Consumer Behaviour.</li> <li>2. Explore, analyse and compare the core theories of consumer behaviour and its application in both consumer and organizational markets</li> <li>3. Appraise modelsofConsumerBehaviouranddeterminethei relevancetoparticularmarketing situations</li> <li>4. Critique the theoretical perspectives associated with consumer decision making, including recognising cognitive biases and heuristics</li> <li>5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to investment decisions.</li> <li>6. Gain knowledge in Problem Recognition and Information Search</li> </ol>
57.	18MBAPM40 2C	Brand Management	<ol style="list-style-type: none"> <li>1. Understand the basic Principles of branding and apply lifelong.</li> <li>2. Craft and evaluate brand strategies</li> <li>3. Evaluate brand extension and its contribution to parent brand</li> </ol>

			<ol style="list-style-type: none"> <li>4. Develop an understanding of brand equity and a range of performance related outcomes.</li> <li>5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to branding.</li> <li>6. Measuring Brand Performance</li> </ol>
58.	18MBAPM40 2D	Sales and Distribution Management	<ol style="list-style-type: none"> <li>1. Understand the basic Principles of selling and distribution management.</li> <li>2. Design and forecast sales and sales budget.</li> <li>3. Formulate strategies to manage the sales force team.</li> <li>4. Understand the different distribution channels.</li> <li>5. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to selling and distribution management.</li> <li>6. Gain knowledge in designing channel systems and channel management</li> </ol>
59.	18MBAPH40 2A	Organizational Change and Development	<ol style="list-style-type: none"> <li>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.</li> <li>2. Devise effective intervention strategies and function as an internal HR consultant to an organization in transition,</li> <li>3. Critically evaluate, in an organizational development framework, the theoretical and practical links between development models</li> <li>4. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to organization change and development concepts.</li> <li>5. Understand creating support systems, managing transition and process-oriented strategies</li> <li>6. Design OD interventions</li> </ol>
60.	18MBAPH40 2B	Performance Management and Appraisal	<ol style="list-style-type: none"> <li>1. Understand the concept of performance management and theoretical framework applied to evaluate the performance of individual or group.</li> <li>2. Comprehend on the performance management process, documentation, types, and ethics pertaining to performance management.</li> <li>3. Understand, critically evaluate, select and apply the best performance appraisal system based on the scenario.</li> <li>4. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to Performance Management and Appraisal.</li> <li>5. Gain knowledge acquisition process and performance evaluation used</li> <li>6. Understand Manager's Responsibility in Performance Planning Mechanics and Documentation</li> </ol>
61.	18MBAPH40 2C	Competency Mapping	<ol style="list-style-type: none"> <li>1. Understand the process of competency mapping and profiling.</li> <li>2. Comprehend the integration of competency profiling to other HR applications and apply the learning lifelong.</li> <li>3. Differentiate the various types of competencies i.e. team competency, role competency.</li> <li>4. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to competency mapping.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Gain knowledge in Integration of competency Based HR Systems</li> <li>6. Understand Ethics in Performance Appraisal</li> </ol>
62.	18MBAPH40 2D	Talent Management	<ol style="list-style-type: none"> <li>1. Understand the concept, process of talent management and its linkages with selection, career development, employee engagement and retention.</li> <li>2. Apply the understanding of Understand the concept, process of talent management and its linkages with selection, career development, employee engagement and retention lifelong.</li> <li>3. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to talent management.</li> <li>4. Assess Comprehensive approach to Retaining employees</li> <li>5. Understand Contemporary Talent Management Issues, Challenges and Best Practices</li> <li>6. Gain knowledge in Designing Integrated Rewards, Sustainable Talent Management and Reward Model</li> </ol>
63.	18MBAPS402 A	Information Systems Audit and Control	<ol style="list-style-type: none"> <li>1. Understand the auditing of information system</li> <li>2. Critically analyse and evaluate the need of Information system audit for the business continuity</li> <li>3. Understand the security, ethical and regulatory issues pertaining to use of information technology in auditing.</li> <li>4. Apply the understanding of the usage of latest developed information system in auditing as a lifelong practice.</li> <li>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.</li> <li>6. Understand information technology regulatory issues</li> </ol>
64.	18MBAPS402 B	Knowledge Management	<ol style="list-style-type: none"> <li>1. Understand the concepts of Knowledge Management</li> <li>2. Understand and apply the tools used for capturing tacit knowledge and learning from the captured knowledge lifelong.</li> <li>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.</li> <li>4. Understand Business strategies related to Knowledge Management</li> <li>5. Gain knowledge in Transformation of an enterprise through Knowledge Management</li> <li>6. Do Knowledge Creation and Codification</li> </ol>
65.	18MBAPS402 C	Digital and Social Media Marketing	<ol style="list-style-type: none"> <li>1. To Understand the Concept of Digital marketing using social media.</li> <li>2. To learn tools and utilize the tools of digital marketing and social media.</li> <li>3. To understand the linkage of digital marketing, social media and analytics</li> <li>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.</li> <li>5. Gain knowledge in Website designing with WordPress</li> <li>6. Understand Social media Marketing Tools</li> </ol>

66.	18MBAPS402 D	System Analysis and Design	<ol style="list-style-type: none"> <li>1. Understand the principles, methods and techniques of systems development</li> <li>2. Comprehend on the problems relating to systems development.</li> <li>3. Understand and apply the various stages of a phased systems analysis method</li> <li>4. Apply the tools for designing and analyzing the software required.</li> <li>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.</li> <li>6. Understand System Implementation</li> </ol>
67.	18MBAPE402 A	Innovation Management	<ol style="list-style-type: none"> <li>1. Understand the concept of innovation and creativity and apply the learning lifelong.</li> <li>2. Comprehend and apply the techniques for generating ideas creatively and applying the same.</li> <li>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</li> <li>4. Gain knowledge on business concepts and innovation of new products</li> <li>5. Understand Brainstorming, Lateral thinking and Synectics</li> <li>6. Gain knowledge Designing Creative Society and Organization-Creativity Training</li> </ol>
68.	18MBAPE402 B	Family Business Management	<ol style="list-style-type: none"> <li>1. Understand the concept family business, managing family business and formulation of succession planning.</li> <li>2. Comprehend on the importance of family culture and its uniqueness in fostering generation entrepreneurship.</li> <li>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</li> <li>4. Gain knowledge in Measuring performance of family firms</li> <li>5. Understand Strategic Planning and the family business</li> <li>6. Gain knowledge in intergenerational growth in entrepreneurial families</li> </ol>
69.	18MBAPE402 C	Entrepreneurial leadership	<ol style="list-style-type: none"> <li>1. Understand the concept of entrepreneurial leadership, types and qualities of leaders steering entrepreneurship.</li> <li>2. Comprehend on the different leadership styles fostering the performance of team and managing the organization.</li> <li>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</li> <li>4. Gain knowledge in Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being</li> <li>5. Understand Various forms of management creativity</li> <li>6. Gain knowledge in Developing Leaders and Planning Succession, Leadership Issue for Future Entrepreneurs</li> </ol>

70.	18MBAPE402 D	Rural Entrepreneurship	<ol style="list-style-type: none"> <li>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.</li> <li>2. Understand and apply the ecosystem to support the entrepreneurship venture in rural area.</li> <li>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</li> <li>4. Gain knowledge in Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being</li> <li>5. Understand Various forms of management creativity</li> <li>6. Gain knowledge in Developing Leaders and Planning Succession, Leadership Issue for Future Entrepreneurs</li> </ol>
71.	18MBAPB402 A	Indian Models of Economy, Business and Management	<ol style="list-style-type: none"> <li>1. Understand the concept of Indian economy and Indian Models of economy</li> <li>2. Select the appropriate business model suitable for the economic condition.</li> <li>3. Comprehend on the sustainability innovation, Patent, IPR and its impact in Entrepreneurship</li> <li>4. Exhibit group leadership, oral and written communication, critical thinking, analysing, planning and team work.</li> <li>5. Gain knowledge in Sustainability Innovation and Entrepreneurship</li> <li>6. Understand Experimentation in Innovation Management, Idea Championship, Participation for Innovation and Co-creation for Innovation</li> </ol>
72.	18MBAPB402 B	Institutional support to Small Business	<ol style="list-style-type: none"> <li>1. Comprehend the basic understanding of the Institutional support system available to small business and their functioning.</li> <li>2. Apply the understanding of the institutional support available to small business in lifelong practice.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>4. Understand Institutional support schemes</li> <li>5. Gain knowledge in Marketing Assistance, Research Development and Training Facilities and Export Assistance to MSMEs</li> <li>7. Understand Role of RBI, RBI Guidelines to commercial banks, lending by Commercial and Development Banks</li> </ol>
73.	18MBAPB402 C	Policy Framework for Small Business	<ol style="list-style-type: none"> <li>1. Understand the different policies applicable to small business and their implications on small businesses.</li> <li>2. Comprehend on policy pertaining to credit, technology, tax benefits and Special Economic Zone. (SEZs) for small business and apply the learning lifelong.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> </ol>

			<ol style="list-style-type: none"> <li>4. Apprehend different level of Institutional Support Schemes to run the business</li> <li>5. Maintain ethical standards in individual and business life</li> <li>6. Demonstrate knowledge on the ways of Development bank and regulators support for small business</li> </ol>
74.	18MBAPB402 D	Contemporary Environment in Small Business	<ol style="list-style-type: none"> <li>1. 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.</li> <li>2. 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.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>4. Understand Micro, Small and Medium Enterprises Development Act (SMEDA)</li> <li>5. Gain knowledge in Changing scenario of SMEs in the era of Liberalization, Privatisation &amp; Globalization (LPG)</li> <li>6. Demonstrate knowledge on the ways of Development bank and regulators support for small business</li> </ol>
75.	18MBAPA40 2A	Human Resource Metrics and Analytics	<ol style="list-style-type: none"> <li>1. Possess the conceptual understanding of the HR metrics and analytics</li> <li>2. Understand the importance of HR metrics and analytics in measuring HR's impact and drive business results.</li> <li>3. Identify the right HR metrics (what to measure, types of measurements etc.) – aligning HR and business goals.</li> <li>4. Utilize metrics into analytics for effective management decisions and align to Strategic decision making.</li> <li>5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>6. Understand which metrics you will need and Implement</li> </ol>
76.	18MBAPA40 2B	Marketing Analytics	<ol style="list-style-type: none"> <li>1. Possess the conceptual understanding of the marketing metrics and analytics</li> <li>2. Understand the importance of marketing metrics and analytics in measuring marketing's impact and drive business results.</li> <li>3. Identify the right marketing metrics (what to measure, types of measurements etc.) – aligning HR and business goals.</li> <li>4. Utilize metrics into analytics for effective management decisions and align to Strategic decision making.</li> <li>5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>6. Understand Non-financial measures, Brand Awareness, Test-drive, Churn, CSAT and Customer Satisfaction</li> </ol>

77.	18MBAPA40 2C	Big Data Analytics	<ol style="list-style-type: none"> <li>1. Possess the conceptual understanding of big volume of data and its utilization in decision making.</li> <li>2. Comprehend on the industry usage of big data in different functions across sectors.</li> <li>3. Understand and apply the appropriate tools and techniques for analyzing the big data.</li> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand Big Data and the New School of Marketing</li> <li>6. Gain knowledge in Probability distribution and Data Modeling</li> </ol>
78.	18MBAPA40 2D	Financial Analytics	<ol style="list-style-type: none"> <li>1. Possess the conceptual understanding of the financial metrics and analytics</li> <li>2. Select appropriate tools and techniques for analyzing the finance data and apply the same.</li> <li>3. Analyze financial data and make decisions to maximise return and minimize risk.</li> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand Association and Classification for finance data</li> <li>6. Gain knowledge in CAPM model and Beta calculation</li> </ol>
79.	18MBAPI402 A	International Finance	<ol style="list-style-type: none"> <li>1. Understand the exchange rate movements, hedging using currency derivatives, and analyse the impact on international trade and investments</li> <li>2. Comprehend on the basics of international financial markets, international financial options and foreign direct investments and its application in lifelong practice.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>4. Develop knowledge on international financial institutions</li> <li>5. Acquire knowledge on foreign trade.</li> <li>6. Understand Financing of foreign trade and Documentation</li> </ol>
80.	18MBAPI402 B	International Marketing Management	<ol style="list-style-type: none"> <li>1. Understand the concept of International marketing environment and the international market entry modes and apply lifelong.</li> <li>2. Comprehend the 4Ps of marketing in international perspective.</li> <li>3. Formulate marketing strategies appropriate for international marketing of products and services.</li> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand about the various disciplines contribution in understanding buyer behaviour in a holistic manner familiar with the advances in International marketing</li> </ol>

			6. Acquire knowledge to analyze consumers behaviour and use them in designing marketing strategies
81.	18MBAPI402 C	International Human Resource Management	<ol style="list-style-type: none"> <li>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.</li> <li>2. Formulate recruitment, training policies pertaining to international human resource management.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>4. Recognize the dynamic relationship between strategy, people, technology, and the processes that drive organizations.</li> <li>5. Gain knowledge in Emerging Trends and Perspectives in HRM Cross Cultural Dimensions</li> <li>6. Integrate the knowledge of International HRM concepts to take correct business decisions</li> </ol>
82.	18MBAPI402 D	Cross cultural Management	<ol style="list-style-type: none"> <li>1. Understand the concept of cross-cultural management and impact of cross-cultural issues on business strategy, business functioning and apply the learning lifelong.</li> <li>2. Apply the cross-cultural concept in managing workforce, managing teams and performing leadership role in organization.</li> <li>3. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>4. Recognize Cultural impact on corporate strategy</li> <li>5. Gain knowledge in Emerging Trends and Perspectives in Cross Cultural Dimensions</li> <li>6. Integrate the knowledge of Big Data and A.I. on multi-cultural organisations</li> </ol>
83.	18MBAPO40 2A	Sourcing Management	<ol style="list-style-type: none"> <li>1. Understand the concept of sourcing and its importance as strategic organizational function.</li> <li>2. Apply the tools and techniques to select the best vendor to deliver quality goods on time and apply the learning lifelong.</li> <li>3. Understand the sourcing in the global perspective.</li> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand the importance of Managing price fluctuation and volatility in international finance</li> <li>6. Gain knowledge in Industry Best Practices, Measurement of sourcing performance and Benchmarking in Retail Purchasing</li> </ol>
84.	18MBAPO40 2B	Pricing and Revenue Management	<ol style="list-style-type: none"> <li>1. Understand the concept of pricing and revenue management.</li> <li>2. Apply the economy, network and capacity control on revenue management and apply the learning lifelong.</li> <li>3. Understand the different type of pricing and choosing appropriate pricing method</li> </ol>

			<ol style="list-style-type: none"> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand the importance of Pre-commitment and Demand Uncertainty and Peak-load pricing under perfect competition</li> <li>6. Gain knowledge in Natural Gas Storage and Transmission in Revenue Management in Practice</li> </ol>
85.	18MBAPO40 2C	Supply Chain Analytics	<ol style="list-style-type: none"> <li>1. Equip with an understanding of the “importance and role of supply chain analytics” in the modern business enterprises</li> <li>2. Comprehend on how business firms can take advantage with the help of supply chain analytics.</li> <li>3. Apply supply chain analytics with analytical platforms.</li> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand the different ways of payment and payment services available.</li> <li>6. Gain knowledge in supply chain analytics management</li> </ol>
86.	18MBAPO40 2D	Services operations management	<ol style="list-style-type: none"> <li>1. Understand the concept of operations management in services sector.</li> <li>2. Comprehend on understanding of services design, service quality, and service facility.</li> <li>3. Apply capacity and demand assessment tools in service operations.</li> <li>4. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>5. Understand process flow diagram, process steps and simulation</li> <li>6. Gain knowledge in supply management tactics, operations planning and control</li> </ol>
87.	18MBAPT402 A	Travel Agency and Tour Operations	<ol style="list-style-type: none"> <li>1. Understand the current trends and practices in the tourism and travel trade sector</li> <li>2. Be aware of travel agency, tour operation business and functions of travel agency</li> <li>3. Know the tour packaging &amp; pricing</li> <li>4. Assess the role and responsibility of travel trade associations</li> <li>5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>6. Understand Classifications of Tour Packages</li> </ol>
88.	18MBAPT402 B	Ecotourism	<ol style="list-style-type: none"> <li>1. Comprehend the theories and practices of ecotourism;</li> <li>2. Familiar with the model of ecotourism projects; and significance of ecotourism;</li> <li>3. Identify issues and challenges of conservation of ecotourism</li> <li>4. Understand the role of the regulatory bodies and society to preserve ecotourism</li> </ol>

			<ol style="list-style-type: none"> <li>5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>6. <u>Gain knowledge in Ecotourism Development Agencies</u></li> </ol>
89.	18MBAPT402 C	Event Management	<ol style="list-style-type: none"> <li>1. Be familiar with the essentials of Event Management;</li> <li>2. Understand the potential of MICE and Event Tourism</li> <li>3. Plan and execute the plan for an Event within time schedule and cost</li> <li>4. Identify event marketing, customer care, marketing tools to develop and communicate appropriate event management</li> <li>5. Be aware of travel industry fairs and its significance</li> <li>6. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> </ol>
90.	18MBAPT402 D	Healthcare Tourism	<ol style="list-style-type: none"> <li>1. Understand the growing importance of medical tourism in contemporary world.</li> <li>2. Comprehend and analyze the push pull factors for medical tourists to select the appropriate medical tourism destination</li> <li>3. Aware of the legal aspects related to the medical tourism.</li> <li>4. Understand the growth and development of medical tourism in India.</li> <li>5. Exhibit behaviour and performance that demonstrates enhanced competence in decision-making, group leadership, oral and written communication, analysing, planning and team work</li> <li>6. Understand Legal Aspects of Medical Tourism</li> </ol>
91.	18MBAP411	Communication Practice	<ol style="list-style-type: none"> <li>1. Demonstrate critical and innovative thinking.</li> <li>2. Display competence in oral, written, and visual communication.</li> <li>3. Show an understanding of opportunities in the field of communication.</li> <li>4. Use current technology related to the communication field.</li> <li>5. Respond effectively to cultural communication differences.</li> <li>6. <u>Demonstrate positive group communication exchanges.</u></li> </ol>

Name of the Department: **Mathematics**

Course: B.Sc. Maths

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19LSU101	Language-I	<p>பாடத்திட்டப் பயன் விளைவு</p> <ol style="list-style-type: none"><li>இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li><li>கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li><li>தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li><li>வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</li><li>சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</li><li>மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</li></ol>
2.	19ENU101	English	<ol style="list-style-type: none"><li>Develop the knowledge of interpersonal skills.</li><li>Establish and maintain social relationships.</li><li>Genres of literature will give moral values of life.</li><li>Develop communication skills in business environment</li><li>Communication skills will get developed.</li><li>Develop to have language competence.</li></ol>
3.	19MMU101	Calculus	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"><li>Understand the concepts of hyperbolic functions.</li><li>Explore the concept of reduction formula and calculate limits in indeterminate forms by a repeated use of L'Hospital rule.</li><li>Use single and multiple integration to calculate the arc length, area and volume.</li><li>Understand the techniques of sketching conics and properties of conics.</li><li>Know about the knowledge on application of vector functions.</li><li>Acquire the knowledge on application of Kepler's second law.</li></ol>
4.	19MMU102	Algebra	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"><li>Know about the basic concepts of set theory.</li><li>Describe the categories of functions.</li><li>Understand the algorithms on operation.</li><li>Use matrix operations to solve system of linear equations.</li><li>Learn how to find characteristic equation, eigen value and eigen vector for matrix.</li></ol>

			6. Know about the applications of linear systems and linear independence.
5.	19MMU103	Physics I	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate proficiency in mathematics and the mathematical concepts to understand physics.</li> <li>2. Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.</li> <li>3. Demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.</li> <li>4. Know about the Laws of thermodynamics.</li> <li>5. Know about the Intrinsic and extrinsic semiconductor.</li> <li>6. Understand the graphical relationship of resistance, capacitor and inductor.</li> </ol>
6.	19MMU111	Calculus - Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Familiarize with the programming environment.</li> <li>2. Acquire the problem solving skills through computer programming.</li> <li>3. Understand to write diversified solutions using programming language.</li> <li>4. Plot of graphs of functions (exponential, logarithmic, trigonometric).</li> <li>5. Sketching parametric curves (E.g. Trochoid, cycloid, epicycloids, hypocycloid).</li> <li>6. Deal with different input/output methods.</li> </ol>
7.	19MMU112	Physics I- Practical	<p>Students can able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Know the physical Principles and applications of Electronics.</li> <li>4. Apply the analytical techniques and graphical analysis to the experimental data.</li> <li>5. Apply the various procedures and techniques for the experiments.</li> <li>6. Use the different measuring devices and meters to record the data with precision.</li> </ol>
8.	19LSU201	Language - II	<p><b>பாடத்திட்டப் பயன் விளைவு</b></p> <ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</li> </ol>

			<p>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</p> <p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
9.	19MMU201	Differential Equations	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the concepts of explicit, implicit and singular solutions of a differential equation.</li> <li>2. Acquire knowledge on linear and bernoulli's equaitons.</li> <li>3. Know the concepts of population model.</li> <li>4. Understand the method of solving differential equation using variation of parameters. Identify the applications of differential equations.</li> <li>5. Know about the concepts of Laplace Transform.</li> <li>6. Understand the concept of inverse Laplace transform.</li> </ol>
10.	19MMU202	Real Analysis	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand about the categories of sets.</li> <li>2. Acquire the knowledge on limits and convergence of sequences.</li> <li>3. Know the types of test of convergence for series.</li> <li>4. Familiarize about the basic theorems on monotone sequences.</li> <li>5. Know about the radius of convergence.</li> <li>6. Understand the Power series and radius of convergence.</li> </ol>
11.	19MMU203	Physics II	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Explain how physics applies to phenomena in the world around them.</li> <li>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.</li> <li>3. Study the theory of Photoelectric effect.</li> <li>4. List different types of atomic spectra.</li> <li>5. Understand the importance of Mosley's law and Bragg's law.</li> <li>6. Understand the concept of digital electronics.</li> </ol>
12.	19MMU211	Differential Equations - Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate comprehension in fundamental topics of computing, algorithms, computer organization and software systems.</li> <li>2. Have applied knowledge of areas of computing to create solutions to challenging problems, including specify, design, implement and validate solutions for new problems.</li> <li>3. Be aware of current research activity in computing through activities including reading papers, hearing research presentations.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Know about successfully planning and completing an individual research project in computing or its application.</li> <li>5. Understand Cauchy's root test and Ratio test by plotting the ratio.</li> <li>6. Acquire the knowledge on Growth model and Decay model</li> </ol>
13.	19MMU212	Physics II- Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics, heat and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Know the physical Principles and applications of Electronics.</li> <li>4. Apply the various procedures and techniques for the experiments.</li> <li>5. Apply the mathematical concepts/equations to obtain quantitative results.</li> <li>6. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.</li> </ol>
14.	19AEC201	Environmental Studies	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Create the awareness about environmental problems among people.</li> <li>2. Develop an attitude of concern for the environment.</li> <li>3. Motivate the public to participate in environment protection and improvement.</li> <li>4. Know about the Role of Information Technology in environment and human health.</li> <li>5. Investigate the Environmental Pollution, effects and control measures of urban and industrial wastes.</li> <li>6. Solve Environment Protection Act, Wildlife Protection Act. Forest Conservation Act.</li> </ol>
15.	18MMU301	PDE and Systems of ODE	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts partial differential equations.</li> <li>2. Gain knowledge about forming the differential equations method of separation of Variables, Initial Boundary Value Problems and method of successive approximations.</li> <li>3. Know about the Reduction of second order Linear Equations to canonical forms.</li> <li>4. Study the Method of separation of variables and Solving the Vibrating String.</li> <li>5. Understand the Basic Theory of linear systems in normal form.</li> <li>6. Use the Numerical methods to solve the real world problems.</li> </ol>
16.	18MMU302	Group Theory I	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Expertise on fundamental of groups.</li> <li>2. Know about Subgroups and its properties.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Understand the concept of cyclic groups and its properties.</li> <li>4. Acquire the knowledge on basic concepts of Permutation group.</li> <li>5. Apply Cauchy's theorem for finite abelian groups.</li> <li>6. Understand the concepts of Isomorphism.</li> </ol>
17.	18MMU303 A	Analytical Geometry	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquiring knowledge of straight lines and area of triangle..</li> <li>2. Know about Reflection properties of parabola.</li> <li>3. Acquire the knowledge on basic concepts of Hyperbola and their applications.</li> <li>4. Study the angles between two directed lines, the projection of a segment.</li> <li>5. Understand the General Equations Tracing of Curves.</li> <li>6. Know about particular cases of Conic sections.</li> </ol>
18.	18MMU303 B	Computer Graphics	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Transfer to the students the skills required for designing and implementing practical graphic solutions to challenging problems in different application domains and make them a competent product.</li> <li>2. Understand different hardware used for graphical requirement.</li> <li>3. Perform visual computations for geometrical drawings.</li> <li>4. Display 3D objects in a 2D display devices using projection techniques.</li> <li>5. Create realistic images using color and shading techniques.</li> <li>6. Developed Computer Animation and Design of Animation Sequences.</li> </ol>
19.	18MMU304	Physics I	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate proficiency in mathematics and the mathematical concepts to understand physics.</li> <li>2. Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.</li> <li>3. Demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.</li> <li>4. Know about the Laws of thermodynamics.</li> <li>5. Know about the Intrinsic and extrinsic semiconductor.</li> <li>6. Understand the graphical relationship of resistance, capacitor and inductor.</li> </ol>
20.	18MMU311	PDE and Systems of ODE - Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Gain knowledge about forming the differential equations method of separation of Variables, Initial Boundary Value Problems and method of successive approximations.</li> <li>2. Understand the elementary theory of partial differential equations, and solve it using various techniques.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Determine solutions to second order linear homogeneous, non-homogeneous differential equations with constant coefficients.</li> <li>4. Solve the Canonical Forms of First-order Linear Equations.</li> <li>5. Understand the Equations with non-homogeneous boundary conditions.</li> <li>6. The application of The Euler method-The modified – Euler method -The Runge-Kutta method.</li> </ol>
21.	18MMU312	Physics-I-Practical	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Know the physical Principles and applications of Electronics.</li> <li>4. Apply the analytical techniques and graphical analysis to the experimental data.</li> <li>5. Apply the various procedures and techniques for the experiments.</li> <li>6. Use the different measuring devices and meters to record the data with precision.</li> </ol>
22.	18MMU401	Numerical Methods	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Study the concept of Newton's Method.</li> <li>2. Realize the system of linear algebraic equations along with specified methods.</li> <li>3. Know about the basic concepts of Interpolation.</li> <li>4. Understand the Gregory forward and backward difference interpolation.</li> <li>5. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.</li> <li>6. Use the solutions of differential equations by Runge-Kutta methods.</li> </ol>
23.	18MMU402	Group Theory II	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Expertise on fundamental theorems of cosets and Lagrange's.</li> <li>2. Know about external direct products and its developments.</li> <li>3. Understand the concept of normal subgroups and factor groups.</li> <li>4. Acquire the knowledge on basic concepts of group homomorphism.</li> <li>5. Study about fundamental theorems of Abelian groups.</li> <li>6. Understand the Isomorphism Classes of Abelian Groups</li> </ol>
24.	18MMU403 A	Graph Theory	<p>On successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand and Apply the fundamental concepts in graph theory.</li> <li>2. Understand basic results related with Eulerian and Hamiltonian graphs.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Study about Chromatic polynomial, Matching and Covering.</li> <li>4. Know about the fundamental concepts of trees.</li> <li>5. Understand the Spanning trees, rank and nullity.</li> <li>6. Mastery in Dijkstra's algorithm-Floyd-Warshall algorithm</li> </ol>
25.	18MMU403 B	Operating System: Linux	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Familiar with the memory allocation methods, page replacement algorithms, file allocation methods, multi-threading, process synchronization, and CPU scheduling.</li> <li>2. Describe the main components of OS and their working.</li> <li>3. Explain the concepts of process and thread and their scheduling policies.</li> <li>4. Solve synchronization and deadlock issues.</li> <li>5. Compare the different techniques for managing memory, I/O, disk and files.</li> <li>6. Design components of operating system.</li> </ol>
26.	18MMU404	Physics-II	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Explain how physics applies to phenomena in the world around them.</li> <li>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.</li> <li>3. Study the theory of Photoelectric effect.</li> <li>4. List different types of atomic spectra.</li> <li>5. Understand the importance of Mosley's law and Bragg's law.</li> <li>6. Understand the concept of digital electronics.</li> </ol>
27.	18MMU411	Numerical Methods - Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Acquire the basic knowledge of MATLAB and explore the structure of the numerical methods.</li> <li>2. Use different memory allocation methods.</li> <li>3. Deal with different input/output methods.</li> <li>4. Use different data structures.</li> <li>5. Express their ideas in terms of the syntax of the computer package MATLAB.</li> <li>6. Apply the MATLAB programme in the real world situation involving numerical problems.</li> </ol>
28.	18MMU412	Physics-II-Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics, heat and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Know the physical Principles and applications of Electronics.</li> <li>4. Apply the various procedures and techniques for the experiments.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Apply the mathematical concepts/equations to obtain quantitative results.</li> <li>6. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.</li> </ol>
29.	17MMU501 A	Ring Theory and Linear Algebra I	<p>On successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the concept of rings, subrings, vector spaces, subspaces, algebra of subspaces, isomorphism and its properties.</li> <li>2. Understand the concept of ring homomorphisms, properties of ring homomorphisms.</li> <li>3. Know about the Vector spaces and dimension.</li> <li>4. Analyze Linear transformations and matrix representation of a linear transformation.</li> <li>5. Study change of coordinate matrix and its properties.</li> <li>6. Understand Isomorphism theorems I, II and III, field of quotients.</li> </ol>
30.	17MMU501 B	Portfolio Optimization	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the various alternatives available for investment.</li> <li>2. Learn to measure risk and return.</li> <li>3. Find the relationship between risk and return.</li> <li>4. Value the equities and bonds.</li> <li>5. Gain knowledge of the various strategies followed by investment practitioners.</li> <li>6. Study Index tracking optimization models.</li> </ol>
31.	17MMU502 A	Probability and Statistics	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts of Measures of central tendency.</li> <li>2. Know about the Probability Concepts and its properties.</li> <li>3. Know about the Discrete distributions and its types.</li> <li>4. Study the Continuous distributions and its types.</li> <li>5. Understand the Basic Theory of Chebyshev's inequality.</li> <li>6. Chapman-Kolmogorov equations, classification of states.</li> </ol>
32.	17MMU502 B	Boolean Algebra and Automata Theory	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand how lattices and Boolean algebra are used as tools and mathematical models in the study of networks.</li> <li>2. Define various categories of automata.</li> <li>3. Context free grammars and pushdown automata.</li> <li>4. Understand Turing machine as a model of computation.</li> <li>5. Define the various categories of Undecidability.</li> <li>6. Knowledge about Post Correspondence Problem.</li> </ol>
33.	17MMU503 A	Multivariate Calculus	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the functions of several variables.</li> <li>2. Know about the Extrema of functions of two variables.</li> <li>3. Use double, triple and its applications.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Know about the change of variables in double integrals and triple integrals</li> <li>5. Synthesize the key concepts of line integrals and its applications.</li> <li>6. Ability to apply the knowledge of Green's theorem and Stoke's theorem</li> </ol>
34.	17MMU503 B	Differential Geometry	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the theory of space curves with examples.</li> <li>2. Study the concept of parametric curves on surfaces.</li> <li>3. Know about the torsion of a geodesic and geodesic curvature.</li> <li>4. Study the Tensors of different type, Algebra of tensors and contraction.</li> <li>5. Know about the Parallel propagation of vectors.</li> <li>6. Understand Laplacian operators in tensor form.</li> </ol>
35.	17MMU504	Physics-I	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate proficiency in mathematics and the mathematical concepts to understand physics.</li> <li>2. Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.</li> <li>3. Demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.</li> <li>4. Know about the Laws of thermodynamics.</li> <li>5. Know about the Intrinsic and extrinsic semiconductor.</li> <li>6. Understand the graphical relationship of resistance, capacitor and inductor.</li> </ol>
36.	17MMU511	Physics-I- Practical	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Know the physical Principles and applications of Electronics.</li> <li>4. Apply the analytical techniques and graphical analysis to the experimental data.</li> <li>5. Apply the various procedures and techniques for the experiments.</li> <li>6. Use the different measuring devices and meters to record the data with precision.</li> </ol>
37.	17MMU601 A	Ring Theory and Linear Algebra II	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Polynomial rings over commutative rings, dual spaces, dual basis, double dual, minimal solutions to systems of linear equations, normal and self-adjoint operators.</li> <li>2. Understand the Divisibility in integral domains.</li> <li>3. Study the transpose of a linear transformation and its matrix in the dual basis.</li> <li>4. Know about the Inner product spaces and norms.</li> <li>5. Study Least Squares Approximation, minimal solutions to systems of linear equations.</li> </ol>

			6. Know about the Orthogonal projections and Spectral theorem.
38.	17MMU601 B	Mechanics	<p>On successful completion of this course students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the concept of the Moment of a force about a point and an axis.</li> <li>2. Classify the Laws of Coulomb friction.</li> <li>3. Solve the problems of Conservative force field and conservation for mechanical energy.</li> <li>4. Solve the Problems of equilibrium under forces including friction.</li> <li>5. Analyze the Velocity and acceleration of a particle along a curve.</li> <li>6. Know about the basic concepts of Simple harmonic motion, Simple Pendulum, Projectile Motion.</li> </ol>
39.	17MMU602 A	Metric Spaces and Complex Analysis	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the various properties of metric spaces</li> <li>2. Definite continuous mappings - sequential criterion.</li> <li>3. Understand the basic concepts of Riemann equations, sufficient conditions for differentiability.</li> <li>4. Explore various properties of Analytic functions.</li> <li>5. Understand the Contour integrals and its examples.</li> <li>6. Apply the concept Liouville's theorem and the fundamental theorem of algebra.</li> </ol>
40.	17MMU602 B	Industrial Mathematics	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Get adequate exposure to global and local concerns so as to explore many aspects of Mathematical Sciences.</li> <li>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.</li> <li>3. Know about the X-ray: Introduction, X-ray behaviour and Beers Law.</li> <li>4. Aware of history of mathematics and hence of its past, present and future role as part of our culture.</li> <li>5. Know the concept of Radon Transform.</li> <li>6. Use the application of Fourier and inverse Fourier transforms.</li> </ol>
41.	17MMU603	Physics – II	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Explain how physics applies to phenomena in the world around them.</li> <li>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.</li> <li>3. Study the theory of Photoelectric effect.</li> <li>4. List different types of atomic spectra.</li> <li>5. Understand the importance of Mosley's law and Bragg's law.</li> <li>6. Understand the concept of digital electronics.</li> </ol>

42.	17MMU611	Physics – II- Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Perform basic experiments in mechanics, heat and electricity and analyze the data.</li> <li>2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.</li> <li>3. Know the physical Principles and applications of Electronics.</li> <li>4. Apply the various procedures and techniques for the experiments.</li> <li>5. Apply the mathematical concepts/equations to obtain quantitative results.</li> <li>6. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.</li> </ol>
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Name of the Department: **Mathematics**

**Course:** M.Sc. Maths

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19MMP101	Algebra	After successful completion of this course the students will be able to <ol style="list-style-type: none"><li>1. Understand the concept and the properties of finite abelian groups.</li><li>2. Get pre-doctoral level knowledge in ring theory.</li><li>3. Attain good knowledge in field theory.</li><li>4. Define and study in details the properties of linear transformations.</li><li>5. Analyze the concept of trace and transpose.</li><li>6. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts quadratic forms.</li></ol>
2.	19MMP102	Real Analysis	On successful completion of this course, students will be able to <ol style="list-style-type: none"><li>1. Get specific skill in Riemann Stieltjes integral and Lebesgue integral.</li><li>2. Attain knowledge in infinite series.</li><li>3. Demonstrate an understanding of the uniform convergence and differentiation.</li><li>4. Enrich their knowledge of measure theory and extremum problems.</li><li>5. Solve given problems at a high level of abstraction based on Implicit function.</li><li>6. Describe the fundamental properties of the real numbers that underpin the formal development of real analysis.</li></ol>
3.	19MMP103	Numerical Analysis	On successful completion of this course, students will be able to <ol style="list-style-type: none"><li>1. Identify the concept of numerical differentiation and integration.</li><li>2. Provide information on methods of iteration.</li><li>3. Solve ordinary differential equations by using Euler and modified Euler method.</li><li>4. Study in detail the concept of boundary value problems.</li><li>5. Attain mastery in the numerical solution of partial differential equations.</li><li>6. Apply numerical methods to obtain approximate solutions to mathematical problems.</li></ol>
4.	19MMP104	Ordinary Differential Equations	On successful completion of this course, students will be able to <ol style="list-style-type: none"><li>1. Model a simple physical system to obtain a first and second order differential equation.</li><li>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.</li><li>3. Identify homogeneous equations, homogeneous equations with constant coefficients and exact linear differential equations.</li></ol>

			<ol style="list-style-type: none"> <li>4. Solve higher order and system of differential equations of Successive approximation.</li> <li>5. Understand the difficulty of solving problems for elementary linear oscillations.</li> <li>6. Identify, analyze and subsequently solve physical situations whose behaviour can be described by ordinary differential equations.</li> </ol>
5.	19MMP105A	Advanced Discrete Mathematics	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop new algebraic structures.</li> <li>2. Think critically and analytically by modelling problems from social and natural sciences with the help of theory of graphs.</li> <li>3. Apply discrete mathematics in formal representation of various computing constructs</li> <li>4. Work effectively in groups on a project that requires an understanding of graph theory.</li> <li>5. Demonstrate different traversal methods for trees and graphs.</li> <li>6. Recognize the importance of analytical problem-solving approach.</li> </ol>
6.	19MMP105B	Number Theory	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Identify how number theory is related to and used in cryptography.</li> <li>3. Identify certain number theoretic functions and their properties.</li> <li>4. Understand the concept of a congruence and use various results related to congruences including the Chinese Remainder Theorem.</li> <li>5. Solve certain types of Diophantine equations.</li> <li>6. Acquire a broad knowledge in Greatest Integer Function.</li> </ol>
7.	19MMP105C	Combinatorics	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Cognition in various combinatorial methods.</li> <li>2. Solve recurrence relations through computational skills.</li> <li>3. Apply the inclusion/exclusion principle.</li> <li>4. Develop fundamental knowledge of combinatorics and Euler function.</li> <li>5. Analyze combinatorial objects satisfying certain properties and answer questions related to Necklace problem.</li> <li>6. Know the concept of Burnside's lemma.</li> </ol>
8.	19MMP106	Mechanics	<p>On successful completion of this course students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the concept of the D'Alembert's principle.</li> <li>2. Derive the Lagrange's equation for holonomic and non holonomic constraints.</li> <li>3. Classify Scleronomic and Rheonomic systems.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Solve the problems of Hamilton equations of motion.</li> <li>5. Study of the canonical transformations.</li> <li>6. Know the concept of Hamilton Jacobi Theory.</li> </ol>
9.	19MMP111	Numerical Analysis - Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Know the concepts for problem solving.</li> <li>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</li> <li>3. Comprehend important issues related to the development of computer-based systems in a professional context using a well-defined process.</li> <li>4. Be familiar with programming with numerical packages.</li> <li>5. Be aware of the use of numerical methods in modern scientific computing.</li> <li>6. To develop the mathematical skills of the students in the areas of numerical methods.</li> </ol>
10.	19MMP201	Linear Algebra	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Recognize some advances of vector spaces and linear transformations.</li> <li>2. Understand the concepts of linear algebra in geometric point of view.</li> <li>3. Visualize linear transformations as a matrix form.</li> <li>4. Decompose a given vector space in to certain canonical forms.</li> <li>5. Know the concept of canonical transformation.</li> <li>6. Understand the concept of Quadratic forms</li> </ol>
11.	19MMP202	Complex Analysis	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Explain the role of the Conformal mapping.</li> <li>2. Evaluate complex contour integrals and some of their consequences.</li> <li>3. Determine the Taylor series or the Laurent series of an analytic function in a given region</li> <li>4. Describe the convergence properties of a power series.</li> <li>5. Know the basic properties of singularities of analytic functions.</li> <li>6. Demonstrate familiarity with a range of examples of these concepts of conformal mapping.</li> </ol>
12.	19MMP203	Optimization Techniques	<p>After successful completion of this course the students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the concept of linear programming and integer programming.</li> <li>2. Develop optimal decision policy skill.</li> <li>3. Familiarize with real life applications of inventory models.</li> <li>4. Skill in decision analysis.</li> <li>5. Mastery in Beale's method and simplex method.</li> <li>6. Use classical optimization techniques and numerical methods of optimization.</li> </ol>

13.	19MMP204	Partial Differential Equations	<p>After successful completion of this course the students will be able to</p> <ol style="list-style-type: none"> <li>1. Classify linear and Nonlinear first order differential equations with constant coefficients.</li> <li>2. Solve the linear partial differential equations with constant coefficient equations.</li> <li>3. Describe the method of separable variables and integral transforms.</li> <li>4. Solve the elementary Laplace equation with symmetry.</li> <li>5. Acquire the knowledge of wave equation and vibrating membranes.</li> <li>6. Enrich their knowledge about diffusion equations with sources.</li> </ol>
14.	19MMP205A	Graph Theory	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Applied the knowledge of graphs to solve the real-life problem.</li> <li>2. Overview of properties of trees and a minimal spanning tree for a given weighted graph.</li> <li>3. Understanding the basic concepts of graphs, directed graphs, and weighted graphs and able to present a graph by matrices.</li> <li>4. Understand Eulerian and Hamiltonian graphs.</li> <li>5. Determine whether graphs are Planer and/or non planer.</li> <li>6. Identify induced subgraphs, cliques, matchings, covers in graphs.</li> </ol>
15.	19MMP205B	Differential Geometry	<p>On successful completion of this course the students will be able to</p> <ol style="list-style-type: none"> <li>1. Obtain in depth knowledge of problems and properties of curves and surfaces based on vector methods in geometrical view point</li> <li>2. Understand fundamental existence theorem for space curves</li> <li>3. Discuss the Involutives and evolutes.</li> <li>4. Mastery in canonical geodesic equations</li> <li>5. Find geodesic curvature for various surfaces</li> <li>6. Determine and calculate curvature of curves in different coordinate systems.</li> </ol>
16.	19MMP205C	Fundamentals of Actuarial Mathematics	<p>On successful completion of this course the student will be able</p> <ol style="list-style-type: none"> <li>1. Explain the basic concepts of accounts and calculations of interest rates in banking / financial institution system.</li> <li>2. Describe about Premiums of Life Insurance and Endowment Assurance (Pure, Double and Marriage) and Educational Annuity plan.</li> <li>3. Define Annuity and Summarize / calculate different values Annuities.</li> <li>4. Find the Annuity values for various Annuities.</li> <li>5. Calculation of Net Premiums for Assurance Plans.</li> <li>6. Leant about how to read Mortality Table and from that how to calculate the Probability of Survival and Death.</li> </ol>

17.	19MMP206	Fluid Dynamics	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Classify and exploit fluids based on the physical properties of a fluid.</li> <li>2. Compute correctly the kinematical properties of a fluid element.</li> <li>3. Apply the concept of Bernoulli's theorem in steady motion.</li> <li>4. Understand both flow physics and mathematical properties of governing Navier-Stokes equations and define proper boundary conditions for solution.</li> <li>5. Provide the student with the basic mathematical background and tools to model fluid motion.</li> <li>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.</li> </ol>
18.	19MMP211	Optimization Techniques – Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Use the object oriented concepts for implementation of Optimization Techniques.</li> <li>2. Implement the data structure concepts for Optimization Techniques problems.</li> <li>3. Acquire skills to solve various multivariable optimization problems</li> <li>4. Solve of different optimization problems.</li> <li>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.</li> <li>6. Use mathematical software to solve the proposed models.</li> </ol>
19.	19MMP301	Functional Analysis	<p>After successful completion of this course the students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop Banach spaces from vector spaces.</li> <li>2. Describe the open mapping theorem.</li> <li>3. Discuss Hilbert spaces and its properties.</li> <li>4. Study in detail about the adjoint of an operator.</li> <li>5. Handle complex problems concerning topics within the area of Functional Analysis.</li> <li>6. Understand and apply fundamental theorems from the theory of normed and Banach spaces.</li> </ol>
20.	19MMP302	Number Theory	<p>On successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Identify how number theory is related to and used in cryptography.</li> <li>3. Identify certain number theoretic functions and their properties.</li> <li>4. Understand the concept of a congruence and use various results related to congruences including the Chinese Remainder Theorem.</li> <li>5. Solve certain types of Diophantine equations.</li> </ol>

			6. Acquire a broad knowledge in Greatest Integer Function.
21.	19MMP303	Mathematical Modeling	<p>On successful completion of this course the student will be able to</p> <ol style="list-style-type: none"> <li>1. Solve problems involving dynamic models, and probabilistic models.</li> <li>2. Understand the use of modern technology in solving real-world to Epidemic models.</li> <li>3. Problems through ordinary differential equations, probability theory, graphs.</li> <li>4. Formulate a mathematical model given a clear statement of the underlying scientific principles.</li> <li>5. Solve basic linear difference equations and solve application problems.</li> <li>6. Know the concept of mathematical modelling through Graphs.</li> </ol>
22.	19MMP304	Mathematical Statistics	<p>After successfully completed this module the students will be able to</p> <ol style="list-style-type: none"> <li>1. Explain the concepts of probability, including conditional probability.</li> <li>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.</li> <li>3. Summarize the main features of a data set and test statistical hypotheses.</li> <li>4. Define basic discrete and continuous distributions, be able to apply them and simulate them in simple cases.</li> <li>5. Explain the concepts of analysis of variance and use them to investigate factorial dependence.</li> <li>6. Describe the main methods of estimation and the main properties of estimators, and apply them.</li> </ol>
23.	19MMP305A	Formal Languages and Automata Theory	<p>On successful completion of this course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the definition of Automata.</li> <li>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.</li> <li>3. Discuss the acceptability of a string by finite automation.</li> <li>4. Applications of Pumping Lemma.</li> <li>5. Design automata, regular expressions and context-free grammars accepting or generating certain languages.</li> <li>6. Acquire concepts relating to the theory of computation and computational models including decidability and intractability.</li> </ol>
24.	19MMP305B	Magnetohydrodynamics	<p>On successful completion of this course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Provide the details of the derivation of ideal and resistive MHD equations.</li> <li>2. Demonstrate the basic properties of ideal MHD.</li> <li>3. Describe electromagnetic boundary conditions.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Explain MHD waves.</li> <li>5. Describe the derivation of fluid equations, energy equation.</li> <li>6. Describe electromagnetic fields in the energy and momentum fluxes.</li> </ol>
25.	19MMP305C	Fuzzy Topology	<p>On successful completion of this course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Able to learn fuzzy set theory.</li> <li>2. Understand the concept of Operations on Fuzzy Sets</li> <li>3. Mastery in fuzzy relations and fuzzy graphs</li> <li>4. Attain in-depth knowledge in fuzzy relations.</li> <li>5. Understand the knowledge of Fuzzy Logic.</li> <li>6. Gain knowledge about the fundamental concepts of <math>\alpha</math>-shading families.</li> </ol>
26.	19MMP306	Mathematical Methods	<p>On successful completion of this course the students will be able to,</p> <ol style="list-style-type: none"> <li>1. Calculate the Fourier transform of elementary functions from the definition.</li> <li>2. Find the Fourier transforms of functions of one variable.</li> <li>3. Calculate the Laplace equation in half plane of standard functions both from the definition and by using tables.</li> <li>4. Equation with separable kernel and Fredholm alternative approximation Method.</li> <li>5. Select and combine the necessary Laplace transform techniques to solve second-order ordinary differential equations.</li> <li>6. Understand the concept of Functionals of the integral forms</li> </ol>
27.	18MMP311	Mathematical Statistics– Practical	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Describe and classify data using statistical terminology.</li> <li>2. Use SPSS to conduct basic descriptive analyses and graphical presentations.</li> <li>3. Define the null hypothesis and the alternative hypothesis and Interpret P values and confidence intervals.</li> <li>4. Understand different measures of effect (e.g. mean difference).</li> <li>5. Know when to use basic statistical hypothesis tests (t-tests, chi-squared tests, correlation) and how to carry out these tests using SPSS.</li> <li>6. Appreciate how to present and interpret these results in scientific reports.</li> </ol>
28.	18MMP401	Measure Theory	<p>After successful completion of this course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Get a clear view of the fundamentals of measure theory.</li> <li>2. Acquaint with the proofs of the fundamental theorems underlying the theory of Lebesgue integration.</li> <li>3. Identify the broader impact of measure theory in ergodic theory and ability to pursue further studies in this area.</li> <li>4. Mastery in the measure spaces and its properties.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Apply the theorems of monotone and dominated convergence and Fatou's lemma.</li> <li>6. Apply Lebesgue decomposition and the Radon-Nikodym theorem.</li> </ol>
29.	18MMP402	Stochastic Processes	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Capable to expose the students to different types mathematical models with a view of random processes.</li> <li>2. Understanding in the concept of birth and death process.</li> <li>3. Solve the Kolmogorov equations problems.</li> <li>4. Compute probabilities of transition between states and return to the initial state after long time intervals in Markov chains.</li> <li>5. Identify classes of states in Markov chains and characterize the classes.</li> <li>6. Stochastic Processes in Queuing Systems.</li> </ol>

Name of the Department: **Microbiology**

**Course:** B.Sc. Microbiology

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19ENU101	English	<ol style="list-style-type: none"><li>1. Develop the knowledge of interpersonal skills.</li><li>2. Establish and maintain social relationships.</li><li>3. Genres of literature will give moral values of life.</li><li>4. Develop communication skills in business environment</li><li>5. Communication skills will get developed.</li><li>6. Develop to have language competence</li></ol>
2.	19MBU101	Introduction To Microbiology And Microbial Diversity	<ol style="list-style-type: none"><li>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.</li><li>2. This course will demonstrate the diversity of microbes and their applications.</li><li>3. Students will know about the various field of Microbiology</li><li>4. Students will know the role of microorganism in fermentation and spoilage</li><li>5. Able to understand the special features of algae, fungi and protozoa</li><li>6. Familiarize with morphologic criteria to differentiate the most common protozoan</li></ol>
3.	19MBU102	Bacteriology	<ol style="list-style-type: none"><li>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</li><li>2. Understand the structural similarities and differences among various physiological groups of bacteria and archaea</li><li>3. Demonstrate theory and practical skills in staining procedures</li><li>4. Understand various Culture media and their applications</li><li>5. Understand various physical and chemical means of sterilization</li><li>6. Know General bacteriology and microbial techniques for isolation of pure culture of bacteria</li></ol>
4.	19MBU103	Biochemistry -I	<ol style="list-style-type: none"><li>1. Understand the structures of enzymes, proteins, carbohydrates and fats</li><li>2. Understand the functions of biomolecules</li><li>3. Analyze the process of metabolism</li><li>4. Understand of nucleic acids and their importance to combine and analyses information.</li></ol>

			<ol style="list-style-type: none"> <li>5. Structure and classification of enzymes, specificity of enzymes</li> <li>6. Summarize the DNA &amp; RNA structure and base pairing schemes</li> </ol>
5.	19MBU111	Basic Microbiology-Practical	<ol style="list-style-type: none"> <li>1. This practical paper will build the student to describe and distinguish the bacterial colonies.</li> <li>2. They also will create knowledge on preparing permanent temporary mounts for fungi, protozoan's and algae.</li> <li>3. Students will able to understand the parasites and its nature.</li> <li>4. They can able to handle the pathogens safely.</li> <li>5. Students able to describe the <i>Spirogyra</i>, <i>Chlamydomonas</i> and <i>Volvox</i></li> <li>6. Students able to handle the instruments in the microbiology laboratory</li> </ol>
6.	19MBU112	Bacteriology-Practical	<ol style="list-style-type: none"> <li>1. Theory and practical skills in staining procedures</li> <li>2. Various Culture media and their applications</li> <li>3. Various microbial culture techniques to obtain isolation of pure cultures of bacteria</li> <li>4. Bacterial endospore and capsule</li> <li>5. Able to analyze the Bacterial size</li> <li>6. Able explain the bacterial motility and flagella</li> </ol>
7.	19MBU113	Biochemistry- I - Practical	<ol style="list-style-type: none"> <li>1. The practical knowledge and the skills associated about various techniques used in Biochemistry.</li> <li>2. The skill in qualitative and quantity analysis of carbohydrates, protein and lipid</li> <li>3. An understanding in protein secondary and tertiary structures</li> <li>4. An insight in enzyme activity and its physical factors influence the activity</li> <li>5. Knowledge on vitamin estimation</li> <li>6. Cognitive skill and students able to solve the numerical problems</li> </ol>
8.	19LSU201	பகுதி - I தமிழ்ப்பாடத்திட்டம்	<ol style="list-style-type: none"> <li>1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.</li> <li>2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.</li> <li>3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு</li> </ol>

			<p>அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.</p> <p>4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .</p> <p>5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.</p> <p>6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்</p>
9.	19MBU201	Biochemistry - Ii	<p>1. A candidate can able to understand metabolic pathways of carbohydrates, proteins, Lipids and Nucleic acid that improve their skills.</p> <p>2. This course will provide clear understanding about the Biological oxidation.</p> <p>3. Students able to categorize the biochemical compounds</p> <p>4. Students able to demonstrate the carbohydrate, protein and nucleic acid</p> <p>5. Students able to comment on metabolism of carbohydrate, protein and lipid.</p> <p>6. Students will analyze structural functional relationships of genes and proteins from bacteria to eukaryotes.</p>
10.	19MBU202	Microbial Physiology And Metabolism	<p>1. The students will be able to understand and predict the various metabolic reactions in microbial cell.</p> <p>2. This will make them predict the intermediate products which can be employed in industrial production processes.</p> <p>3. Students will understand the growth, nutrition and environmental factors</p> <p>4. Students able to assess the prokaryotes by observing the biochemical reaction</p> <p>5. This course will support them to interpret the fermentation using microbes</p> <p>6. Able to summarize the nutrients uptake system in the prokaryotes</p>
11.	19MBU203	Microbial Genetics	<p>1. This course provided candidates with basic knowledge and understanding of Molecular Biology with special reference to microbial genome.</p> <p>2. Students undertaking this course will be able to describe the nature of molecular world and its application in modern Microbiological sectors.</p> <p>3. Students able to understand the properties, structure and function of genes in microorganism at the molecular level</p> <p>4. Describe the importance of genetic code and operon concept</p>

			<ol style="list-style-type: none"> <li>5. Discuss the molecular mechanisms underlying mutations and repair mechanisms</li> <li>6. Able to summarize the concept of recombination, linkage mapping and elucidate the gene transfer mechanisms in prokaryotes and eukaryotes</li> </ol>
12.	19MBU211	Basic Biochemistry - Practical II	<ol style="list-style-type: none"> <li>1. Students will get practical knowledge about various techniques used in Biochemistry.</li> <li>2. Students will evaluate the protein and cholesterol</li> <li>3. Able to purify the compounds using chromatography</li> <li>4. Students able to separate the amino acid and sugar using thin layer chromatography</li> <li>5. Able to discuss about biochemical compound and its estimation using standard method</li> <li>6. Students able to separate the plant pigments</li> </ol>
13.	19MBU212	Microbial Physiology And Metabolism – Practical	<ol style="list-style-type: none"> <li>1. The students will be able to analyze the bacteria growth and growth condition</li> <li>2. Able to identify the various factors for optimal growth of <i>E.coli</i>.</li> <li>3. Understand the basic microbial structure and functions of various physiological groups of prokaryotes.</li> <li>4. Able to utilize the various Culture media in the proper physical condition for fermentation</li> <li>5. Able to explain the microbial metabolism – Autotrophy and heterotrophy modes of nutrition</li> <li>6. Students able to understand the physical and chemical growth requirements of bacteria and thermal death time of bacteria.</li> </ol>
14.	19MBU213	Microbial Genetics - Practical	<ol style="list-style-type: none"> <li>1. Students undertaking this practical shall be able to describe the key concept in the basic Microbial Genetics</li> <li>2. Effectively understand the implication of mutation and its characteristics.</li> <li>3. Further, the experiments would allow students to recall and relate the information gained from Microbial Genetics theory paper and skills associated with it</li> <li>4. Students able demonstrate the gene transfer techniques</li> <li>5. Students can estimate the genetic materials</li> <li>6. Able to distinguish the plasmid and Genomic DNA.</li> </ol>
15.	19AEC201	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>2. Master core concepts and methods from economic, political, and social analysis as</li> </ol>

			<p>they pertain to the design and evaluation of environmental policies and institutions.</p> <ol style="list-style-type: none"> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world</li> </ol>
16.	19MBU301	Virology	<ol style="list-style-type: none"> <li>1. This paper will have clear understanding the role of various in plant, animal and human disease</li> <li>2. Candidate able to understand their skill based various mechanisms to enter and escape from host.</li> <li>3. Comprehend the intricate interaction between viruses and host cells</li> <li>4. Understand the interactions between viruses and the host immune system</li> <li>5. 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.</li> <li>6. Explain vaccine strategies and mechanisms of antiviral drugs and interferons</li> </ol>
17.	19MBU302	Food And Dairy Microbiology	<ol style="list-style-type: none"> <li>1. Provides job-oriented information about the role of microorganisms in many foods, and beverage industries both in production and spoilage processes.</li> <li>2. Develop job-based output on industrial based technologies on Food microbiology.</li> <li>3. It will explain the interactions between microorganisms and the food environment, and factors influencing their growth and survival.</li> <li>4. Discuss the microbiology of different types of food commodities.</li> <li>5. Students are able to identify the pathogens from spoiled food</li> <li>6. Explain why microbiological quality control programmes are necessary in food production.</li> </ol>
18.	19MBU303	Industrial Microbiology	<ol style="list-style-type: none"> <li>1. Provides knowledge in the large scale production of industrial product, providing the trends to cater the needs of industry.</li> <li>2. This will help the students to enhance their</li> </ol>

			<p>employment knowledge on microbiology based commercial products.</p> <ol style="list-style-type: none"> <li>The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.</li> <li>This course covers the principles of various processes associated with the production and recovery of different bio-products derived from microorganisms.</li> <li>Students are able recover the different bio-products from microorganisms.</li> <li>The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.</li> </ol>
19.	19MBU304A	Microbial Quality Control In Food And Pharmaceutical Industries	<ol style="list-style-type: none"> <li>Imparts skilled knowledge on good manufacturing practices and food spoilage of different types of foods.</li> <li>Develop skills on Food and drug based microbiological analysis.</li> <li>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.</li> <li>To organize functions for creating awareness about the importance of safe processed nutritious food.</li> <li>To provide diagnostic analysis of food and pharmaceutical products.</li> <li>The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.</li> </ol>
20.	19MBU304B	Microbial Diagnosis In Health Clinic	<ol style="list-style-type: none"> <li>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.</li> <li>It describes the basic mechanisms of pathogenesis of infectious diseases.</li> <li>It explains the basic principles of diagnosis, antimicrobial treatment, prevention and control of infectious diseases in the hospital and community.</li> <li>It help the students to understand the host immune system and explain the host response to infection</li> <li>Understand and interpret basic laboratory tests for the diagnosis of infectious diseases.</li> <li>Apply the principles of molecular and immunological techniques for the diagnosis of infectious diseases.</li> </ol>
21.	19MBU311	Virology–Practical	<ol style="list-style-type: none"> <li>Upon paper completion, students will have skill based knowledge on structure of plants, animal, bacteria and viruses.</li> </ol>

			<ol style="list-style-type: none"> <li>2. This paper also enables the student on isolation, propagation of various viruses.</li> <li>3. It will help the students to understand the plant and animal viruses.</li> <li>4. Students can distinguish the viruses According to their characteristic features.</li> <li>5. It will explain the research activities involved in virology studies.</li> <li>6. Skill based viral analysis can be performed in medical research.</li> </ol>
22.	19MBU312	Food And Dairy Microbiology – Practical	<ol style="list-style-type: none"> <li>1. Provides necessary entrepreneurial information on the food, dairy Microbiology in safety and quality perspective.</li> <li>2. It will help to study the importance in the prevention of contamination that might be caused by the microorganisms.</li> <li>3. To Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries</li> <li>4. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation</li> <li>5. 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</li> <li>6. Acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems.</li> </ol>
23.	19MBU313	Industrial Microbiology – Practical	<ol style="list-style-type: none"> <li>1. Provides knowledge in the large scale production of industrial product, and teaches the modern employment trends to cater the needs of industry.</li> <li>2. Students will differentiate the types of fermentation processes</li> <li>3. Understand the biochemistry of various fermentations</li> <li>4. Identify techniques applicable for Improvement of microorganisms based on known biochemical pathways and regulatory mechanisms</li> <li>5. Comprehend the techniques and the underlying principles in downstream processing</li> <li>6. Students can able to explore the practical skills in research activities.</li> </ol>
24.	19MBU314A	Microbial Quality Control In Food And Pharmaceutical Industries – Practical	<ol style="list-style-type: none"> <li>1. This paper imparts skilled knowledge on good manufacturing practices and food spoilage of different types of foods.</li> <li>2. Students can develop their entrepreneurial skills in food and pharma sectors.</li> <li>3. Good Manufacturing Practices (GMP) and associated guidelines for drugs, natural</li> </ol>

			<p>health products, cannabis and food</p> <ol style="list-style-type: none"> <li>4. Good documentation Practices (GDP) and Data Integrity (DI)</li> <li>5. Validation for equipment, methods, cleaning and process</li> <li>6. Quality systems such as investigations, document management systems, Standard Operating Procedures (SOP), change management system, recall management and inspection management.</li> </ol>
25.	19MBU314B	Microbial Diagnosis In Health Clinic - Practical	<ol style="list-style-type: none"> <li>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.</li> <li>2. Helps to understand the use of lab animals in medical field.</li> <li>3. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.</li> <li>4. Explain the methods of microorganism's control, e.g. chemotherapy &amp; vaccines. Solve problems in the context of this understanding.</li> <li>5. Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures.</li> <li>6. It will help the students to understand the general bacteriology and microbial techniques for isolation of pure cultures of Microorganisms.</li> </ol>
26.	19MBU401	Immunology	<ol style="list-style-type: none"> <li>1. Introducing the employment aspect of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.</li> <li>2. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity</li> <li>3. Develop understanding about immune system, antigen antibody interactions.</li> <li>4. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.</li> <li>5. Students can able to perform basic immunological assays.</li> <li>6. It will distinguish fundamental knowledge on immunology and its advancement</li> </ol>
27.	19MBU402	Medical Microbiology	<ol style="list-style-type: none"> <li>1. It provides the ability to characterize, isolate and identify different microbes.</li> <li>2. It includes a detailed study of characterization, etiology, pathogenicity, clinical systems, and laboratory diagnosis of disease causing Microorganisms.</li> <li>3. Upon completion, students gained the</li> </ol>

			<p>knowledge of most common medically important organism and the infections they cause.</p> <ol style="list-style-type: none"> <li>4. Different approaches, techniques and tools used to identify pathogens and control them.</li> <li>5. Diagnostic approaches for microbial pathogens</li> <li>6. Developing efficient vaccines and new drugs</li> </ol>
28.	19MBU403	Environmental Microbiology	<ol style="list-style-type: none"> <li>1. It provides a comprehensive overview of biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.</li> <li>2. Students will get the basic knowledge how to prepare and perform sampling and microbial analyses for the environmental studies.</li> <li>3. Critically discuss the need for environmental microbiology and agricultural microbiology and explain their limitations.</li> <li>4. Clarify application of microorganisms in varied fields of agricultural and environmental microbiology like bioremediation, biofertilizers and waste water treatment.</li> <li>5. Analyse various aspects of N<sub>2</sub> fixation, Phosphate solubilization, PGPR, biodegradation and bioremediation mechanisms provided by microbes.</li> <li>6. Describe role of microorganism in recycling soil nutrients, biodegradation of complex plant polymers, sustaining and improving plant growth through improving nutrient availability.</li> </ol>
29.	19MBU404A	Biofertilizers And Biopesticides	<ol style="list-style-type: none"> <li>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.</li> <li>2. Provides detailed entrepreneurial idea about biofertilizer production and plant disease.</li> <li>3. To produce and impart training of eco-friendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.</li> <li>4. To demonstrate the know-how technology pertinent to microbiological and physico-chemical analyses of soil samples and their assessment.</li> <li>5. To demonstrate the low cost media preparation and cultural practices in biofertilizer / biopesticide production.</li> <li>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</li> </ol>
30.	19MBU404B	Recombinant DNA Technology	<ol style="list-style-type: none"> <li>1. Imparts the entrepreneurial concepts of rDNA technology and their applications and</li> </ol>

			<p>Acquire knowledge on the applications of genetic engineering.</p> <ol style="list-style-type: none"> <li>Understand the difference between old biotechnology and modern biotechnology.</li> <li>Provide examples of current applications of biotechnology and advances in the different areas like medical, microbial, environmental, bioremediation, agricultural, plant, animal, and forensic sciences.</li> <li>Explain the general principles of generating transgenic plants, animals and microbes.</li> <li>Technical know-how on versatile techniques in recombinant DNA technology.</li> <li>An understanding on application of genetic engineering techniques in basic and applied experimental biology</li> </ol>
31.	19MBU411	Immunology – Practical	<ol style="list-style-type: none"> <li>Introducing the science of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.</li> <li>Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity</li> <li>Develop understanding about immune system, antigen antibody interactions.</li> <li>Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.</li> <li>After course completion, students can apply the knowledge in further studies and higher education.</li> <li>Knows the concepts of advanced immunological assays</li> </ol>
32.	19MBU412	Medical Microbiology - Practical	<ol style="list-style-type: none"> <li>It provides the entrepreneurial ability to characterize, isolate and identify different microbes.</li> <li>It includes a detailed study of characterization, etiology, pathogenicity, clinical systems, and laboratory diagnosis of disease-causing Microorganisms.</li> <li>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.</li> <li>Comprehend the various methods for identification of unknown microorganisms.</li> <li>Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.</li> <li>Explain the methods of microorganisms control, e.g. chemotherapy &amp; vaccines. Solve problems in the context of this understanding. • Demonstrate practical skills</li> </ol>

			in fundamental microbiological techniques.
33.	19MBU413	Environmental Microbiology – Practical	<ol style="list-style-type: none"> <li>1. Provides a comprehensive overview of biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.</li> <li>2. Understand various plant microbes interactions especially rhizosphere and their applications especially the biofertilizers and their production techniques</li> <li>3. Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems</li> <li>4. waste water treatment and bioremediation</li> <li>5. Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission</li> <li>6. Comprehend the various methods to determine the Sanitary quality of water and sewage treatment methods employed in waste water treatment</li> </ol>
34.	19MBU414A	Biofertilizers And Biopesticides - Practical	<ol style="list-style-type: none"> <li>1. Provide the student knowledge about eco-friendly product which play a crucial role in determining its future use and applications in environmental management.</li> <li>2. Provides detailed idea about biofertilizer production and plant disease.</li> <li>3. Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems</li> <li>4. waste water treatment and bioremediation</li> <li>5. Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission</li> <li>6. Comprehend the various methods to determine the Sanitary quality of water and sewage treatment methods employed in waste water treatment</li> </ol>
35.	19MBU414B	Recombinant DNA Technology – Practical	<ol style="list-style-type: none"> <li>1. Imparts the concepts of rDNA technology and their applications and Acquire knowledge on the applications of genetic engineering.</li> <li>2. Students will develop understanding about isolation and enumeration of microorganisms from various samples.</li> <li>3. Microbial identification and characterization using a number of approaches will be well understood.</li> <li>4. Acquainted with molecular modification approaches that encompass extraction, purification, quantification and augmentation.</li> </ol>

			<ol style="list-style-type: none"> <li>5. To give basic understanding of microbial genetic manipulations</li> <li>6. To understand working of different laboratory equipment's used in microbiological laboratories</li> </ol>
36.	19MBU501A	Management Of Human Microbial Diseases	<ol style="list-style-type: none"> <li>1. Develop skills for identification, classification, and characterization of various pathogens.</li> <li>2. To describe and practice the basic principles of chemotherapy and disinfection through laboratory exercises accompanied by case studies.</li> <li>3. Upon completion, students gained the knowledge of most common medically important organism and the infections they cause.</li> <li>4. Different approaches, techniques and tools used to identify pathogens and control them.</li> <li>5. Diagnostic approaches for microbial pathogens</li> <li>6. Developing efficient vaccines and new drugs.</li> </ol>
37.	19MBU501B	Microbiological Analysis Of Air And Water	<ol style="list-style-type: none"> <li>1. Provides employability skills involved in the air and water analysis</li> <li>2. Characterization of microorganisms from water and air samples</li> <li>3. 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.</li> <li>4. Validation for equipment, methods, cleaning and process</li> <li>5. Students can develop their entrepreneurial skills in analysis of air and water sample.</li> <li>6. Learning the basic principles of microbiological analysis of environmental sector</li> </ol>
38.	19MBU502A	Biostatistics And Biomathematics	<ol style="list-style-type: none"> <li>1. Students get an idea about collection, interpretation and presentation of statistical data.</li> <li>2. Statistics, a branch of applied Mathematics, is regarded as mathematics applied to observational data.</li> <li>3. Conceivably everything dealing with the collection, processing, analysis and interpretation of numerical data belongs to the domain of statistics.</li> <li>4. To introduce students to the use of R for the analysis of biological processes and data, including simple computer programming.</li> <li>5. have an enhanced knowledge and understanding of mathematical modelling and statistical methods in the analysis of</li> </ol>

			<p>biological systems;</p> <p>6. To analyse data from experiments and draw sound conclusions about the underlying processes using their understanding of mathematics and statistics be better able to assess biological inferences that rest on mathematical and statistical arguments.</p>
39.	19MBU502B	Bioinformatics	<ol style="list-style-type: none"> <li>1. Provides computational skill on search engines and various software tools involved in bioinformatics</li> <li>2. It will impart computational based techniques which includes genomics and proteomics in Bioinformatics.</li> <li>3. Retrieve information from available databases and use them for microbial identifications and drug designing</li> <li>4. Gain ability to modify gene and protein structures in simulated systems.</li> <li>5. Introduction to the basics of sequence alignment and analysis.</li> <li>6. Describe about the different types of Biological databases</li> </ol>
40.	19MBU503A	Instrumentation And Biotechniques	<ol style="list-style-type: none"> <li>1. The students with an opportunity to develop skill on the bioinstrumentation and concepts of principles and applications.</li> <li>2. Define and explain various fundamentals of spectroscopy, qualitative and quantitative analysis and characterize functionalities of biomolecules by using spectroscopic techniques.</li> <li>3. Explain the various separation techniques and its instrumentation.</li> <li>4. Describe the principle and working of various radiation detectors.</li> <li>5. Evaluate the various types &amp; applications of chromatography and electrophoresis.</li> <li>6. Appreciate the working principles and applications of Microscopy</li> </ol>
41.	19MBU503B	Plant Pathology	<ol style="list-style-type: none"> <li>1. This will enable for learning the techniques to save endangered species which will be useful for mankind</li> <li>2. Describe the concepts of what constitutes disease in plants.</li> <li>3. Identify major principles of plant pathology.</li> <li>4. Recognize the etiological agents of disease.</li> <li>5. Employ methods to diagnose and manage a wide range of plant diseases.</li> <li>6. Describe aspects of integrated pest management.</li> </ol>
42.	19MBU504A	Microbial Biotechnology	<ol style="list-style-type: none"> <li>1. This paper imparts knowledge on applications of microorganisms in various fields and helps to gain employability in pharmaceutical industries</li> <li>2. Describe about different sewage treatment methods employed in waste water treatment.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Learn about the global environmental problems.</li> <li>4. To provide a fundamental knowledge about the various scopes in environmental and industrial studies.</li> <li>5. Learn about the applications of microbes in biotransformations, therapeutic and industrial biotechnology</li> <li>6. Describe aspects of genetically engineered microbes for industrial application</li> </ol>
43.	19MBU504B	Inheritance Biology	<ol style="list-style-type: none"> <li>1. This paper imparts knowledge on the different aspects of genetics and pedigree analysis.</li> <li>2. Understand the central dogma of molecular biology and the genome of prokaryotic and eukaryotic microorganisms.</li> <li>3. To gain knowledge about the microbial genetics and central dogma of molecular biology</li> <li>4. Students will understand the cellular components underlying mitotic cell division.</li> <li>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.</li> <li>6. To describe applications and techniques of modern genetic technology, as well as select the correct techniques to solve practical genetic problems.</li> </ol>
44.	19MBU511A	Management Of Human Microbial Diseases - Practical	<ol style="list-style-type: none"> <li>1. Involves the identification, classification, and characterization of pathogenic species.</li> <li>2. This paper imparts employability in hospital laboratories.</li> <li>3. Properly use aseptic techniques, including sterilization. Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria.</li> <li>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</li> <li>5. microbes, pathogens and their control Learning methods for antimicrobial susceptibility testing</li> <li>6. 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.</li> </ol>
45.	19MBU511B	Microbiological Analysis Of Air And Water – Practical	<ol style="list-style-type: none"> <li>1. This paper teaches different laboratory skills of analyzing air and water.</li> <li>2. Hand on training of the general equipment used in microbiology laboratory</li> </ol>

			<ol style="list-style-type: none"> <li>3. Develop capability to perform different gene transfer methods in microbes</li> <li>4. Characterization of microorganisms from water and air samples</li> <li>5. Enumeration of bacteria and fungi from air by membrane filtration technique</li> <li>6. Gain knowledge about water pollution and waste water treatments</li> </ol>
46.	19MBU512A	Biomathematics And Biostatistics - Practical	<ol style="list-style-type: none"> <li>1. Students get an idea about collection, interpretation and presentation of statistical data.</li> <li>2. Statistics help in providing data as well as tools to analyze the data.</li> <li>3. Some powerful techniques are index numbers, time series analysis, and also forecasting.</li> <li>4. Statistical knowledge helps you use the proper methods to collect the data, employ the correct analyses, and effectively present the results.</li> <li>5. To show how mathematics, statistics and computing can be used in an integrated way to analyse biological systems.</li> <li>6. Conceivably everything dealing with the collection, processing, analysis and interpretation of numerical data belongs to the domain of statistics.</li> </ol>
47.	19MBU512B	Bioinformatics - Practical	<ol style="list-style-type: none"> <li>1. This course has been intended to provide the learner insights into helpful areas of Bioinformatics which plays an essential role in application-oriented biology.</li> <li>2. Provides computational skill on search engines and various software tools involved in bioinformatics</li> <li>3. Learning methods for designing primers and in-silico PCR</li> <li>4. Develop competence to retrieve information from biological databases and integrate this biological information with computational software's.</li> <li>5. Design an experiment with step-by-step instructions to address a research problem</li> <li>6. Technical know-how on versatile techniques in bioinformatics techniques</li> </ol>
48.	19MBU513A	Instrumentation And Biotechniques – Practical	<ol style="list-style-type: none"> <li>1. Offers the students with an opportunity to gain practical skills on the bioinstrumentation and concepts of principles and applications.</li> <li>2. Evaluate the various types &amp; applications of chromatography and electrophoresis.</li> <li>3. Evaluate the various types &amp; phase contrast microscopy and Electron microscopy</li> <li>4. Explain the various separation techniques and its instrumentation.</li> <li>5. Hand on training of the general equipment</li> </ol>

			<p>used in microbiology laboratory</p> <ol style="list-style-type: none"> <li>6. Comprehend the major spectrophotometric and titrimetric approaches of quantification in biological and environmental samples</li> </ol>
49.	19MBU513B	Plant Pathology – Practical	<ol style="list-style-type: none"> <li>1. This will enable for learning the techniques to save endangered species which will be useful for mankind.</li> <li>2. Identify major principles of plant pathology.</li> <li>3. Demonstration of fungal, bacterial and viral plant pathogens.</li> <li>4. Recognize the etiological agents of disease.</li> <li>5. Employ methods to diagnose and manage a wide range of plant diseases.</li> <li>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</li> </ol>
50.	19MBU514A	Microbial Biotechnology - Practical	<ol style="list-style-type: none"> <li>1. Impart knowledge on applications of microorganisms in various fields</li> <li>2. Provides skill development on microbial products.</li> <li>3. To study the immobilization techniques and fungal pigment production.</li> <li>4. Develop a xylanase and lipase production technology.</li> <li>5. Demonstration of algal single cell proteins.</li> <li>6. State of art knowledge about various methodological and analytic approaches that are used within the specialization.</li> </ol>
51.	19MBU514B	Inheritance Biology - Practical	<ol style="list-style-type: none"> <li>1. Imparts knowledge on the different aspects of genetics and pedigree analysis.</li> <li>2. Students will understand the cellular components underlying mitotic cell division</li> <li>3. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.</li> <li>4. Identify the organs and tissue systems of plants, and explain their respective function</li> <li>5. Understand how molecular cell biology forms the foundation of biotechnology</li> <li>6. Students will learn about DNA, RNA and the molecular events that govern cell functions</li> </ol>
52.	19MBU601A	Mushroom Cultivation	<ol style="list-style-type: none"> <li>1. Able to Know the architecture of mushrooms</li> <li>2. To know the methods used to cultivate mushroom.</li> <li>3. Students are able to predict where the mushroom placed in vegetable kingdom</li> <li>4. Able to cultivate mushrooms from agricultural waste.</li> <li>5. Have an idea about packaging and storing.</li> <li>6. Have understand nutritional value of mushrooms.</li> </ol>
53.	19MBU601B	Food Fermentation Techniques	<ol style="list-style-type: none"> <li>1. Students Imparts knowledge on various microorganisms involved in food</li> </ol>

			<p>fermentation and develops the skills on Fermented Foods and production process.</p> <ol style="list-style-type: none"> <li>Students able to Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation</li> <li>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</li> <li>Acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems.</li> <li>Have knowledge in fermented products and the role of microorganisms.</li> <li>Able to discriminate pathogens and legatee.</li> </ol>
54.	19MBU602A	Biosafety And Intellectual Property Rights	<ol style="list-style-type: none"> <li>Provides knowledge on safety aspects in biological laboratory and to create awareness on the Intellectual property rights and patenting of biotechnological processes.</li> <li>To gain knowledge on steps of a patenting process and the role of biosafety committee.</li> <li>To emphasize the components and design of laboratory.</li> <li>Provide learning opportunities to critically evaluate research methodology and findings</li> <li>Enable students to acquire expertise in the use and application of the methods of data collection and analysis.</li> <li>Enable students to be reflexive about their role and others' roles as researchers</li> </ol>
55.	19MBU602B	Microbes In Sustainable Agriculture And Development	<ol style="list-style-type: none"> <li>Develops the programmatic activities in sustainable agriculture and food systems</li> <li>Able to relate their knowledge about ecology to its relevance in sustainable agriculture</li> <li>Provides detailed idea about biofertilizer production and develop entrepreneur skill related to agriculture field.</li> <li>Understand on soil characteristics and biogeochemical cycling.</li> <li>Students able to the uses of microorganisms as bio control agents.</li> <li>Understand transgenic crops and their use in agriculture.</li> </ol>
56.	19MBU603A	Cell Biology	<ol style="list-style-type: none"> <li>Basic concept of cell structure, membrane, cellular functions of different types of cell, modes of cellular signalling and signal amplification.</li> <li>Students able to annotating cell organization of prokaryotic and Eukaryotic.</li> <li>Students able to paraphrase cell death and cell renewal.</li> <li>Able to bullet pointing protein sorting and transport</li> <li>Expertise in interpreting cell internal</li> </ol>

			organelles. 6. Knowledge in induced pluripotent stem cells
57.	19MBU603B	Molecular Biology	<ol style="list-style-type: none"> <li>1. Explores technologies using molecular biology, embryo manipulation, cell and tissue culture.</li> <li>2. Manipulate the genomes of animals for ways to improve the livestock for food production and biomedical purpose.</li> <li>3. Develop the skills in molecular biology.</li> <li>4. Executing concept of RNA splicing and mRNA and its significance.</li> <li>5. Students able to inferring various model of DNA replication</li> <li>6. Students able to contrast translational machinery.</li> </ol>
58.	19MBU611A	Mushroom Cultivation - Practical	<ol style="list-style-type: none"> <li>1. To impart knowledge on various mushrooms and its cultivation techniques to become an entrepreneur.</li> <li>2. Students able to predict classification of edible mushroom.</li> <li>3. Able to cultivate spawn from waste materials.</li> <li>4. Have a knowledge in sterilization and handling of mushroom.</li> <li>5. Students understand the application of mushroom biotechnology.</li> <li>6. Students understand the characteristics and importance of mushrooms</li> </ol>
59.	19MBU611B	Food Fermentation Techniques – Practical	<ol style="list-style-type: none"> <li>1. To impart knowledge on various microorganisms involved in food fermentation.</li> <li>2. To nurture the student to gain employability in industrial area.</li> <li>3. Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods.</li> <li>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</li> <li>5. Have an idea to isolate beneficial microorganisms from spoiled food.</li> <li>6. Identify methods to control deterioration and spoilage</li> </ol>
60.	19MBU612A	Biosafety And Intellectual Property Rights – Practical	<ol style="list-style-type: none"> <li>1. Able to understand safety aspects in biological laboratory.</li> <li>2. To create awareness on the Intellectual property rights and patenting of biotechnological processes.</li> <li>3. To equip students with a basic understanding of the underlying principles of quantitative and qualitative patenting methods.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Provide students with in-depth training on the conduct and management of patent filing from inception</li> <li>5. Enable students to acquire expertise in the use and application of the methods of data collection and analysis.</li> <li>6. Enable students to be reflexive about their role and others' roles as researchers.</li> </ol>
61.	19MBU612B	Microbes In Sustainable Agriculture And Development – Practical	<ol style="list-style-type: none"> <li>1. Able to relate their knowledge about ecology to its relevance in sustainable agriculture</li> <li>2. Provides detailed idea about biofertilizer production and develop entrepreneur skill related to agriculture field.</li> <li>3. Able to device biogas plant</li> <li>4. Students will be annotate various zone in soil profile</li> <li>5. Students will be isolate various degrading microorganisms for agricultural use.</li> <li>6. Criticize the role of soil microbes in crop production.</li> </ol>
62.	19MBU613A	Cell Biology - Practical	<ol style="list-style-type: none"> <li>1. To understand the basic concept of cell structure, membrane, cellular functions of different types of cell</li> <li>2. Able to analyses modes of cellular signalling and signal amplification.</li> <li>3. Able to categorize cell internal organs.</li> <li>4. Able to retrieve polypoid stage in vegetables</li> <li>5. Able to predict cancer cells through photomicrograph</li> <li>6. Knowledge about detailed structure of cell organelles and electron micro graphs.</li> </ol>
63.	19MBU613B	Molecular Biology - Practical	<ol style="list-style-type: none"> <li>1. Explores technologies using molecular biology, cell and tissue culture to manipulate the genomes of animals for ways.</li> <li>2. Develop the skills in molecular biology.</li> <li>3. Student capable of explaining process involved in genetic changes and mutations</li> <li>4. The identification of genetic regulatory mechanism and distinguishing different mechanism of gene regulation</li> <li>5. The design of different techniques based on utilizing the genetic mechanism of microbes.</li> <li>6. Hand on experience of different microbial genetic modification strategies.</li> </ol>

Name of the Department: **Microbiology**

**Course:** M.Sc. Microbiology

<b>Sl. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Course Outcomes</b>
1.	19MBP101	Fundamentals Of Microbiology And Classification	<ol style="list-style-type: none"><li>1. Understand the basic microbial structure and functions of various physiological groups of prokaryotes and eukaryotes.</li><li>2. Learn the theory and practical skills in microscopy handling and staining techniques know various culture media and their applications.</li><li>3. Study microbial nutrition - Autotrophy and heterotrophy modes of nutrition.</li><li>4. Identify the unknown organisms by using microbial tools.</li><li>5. Demonstrate electricity generation from the organic matter.</li><li>6. Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism – Autotrophy and heterotrophy</li></ol>
2.	19MBP102	Microbial Physiology and Metabolism	<ol style="list-style-type: none"><li>1. The students will be able to understand and predict the various metabolic reactions in microbial cell.</li><li>2. This will make them to predict the intermediate products which can be employed in industrial production processes.</li><li>3. The students will be able to know how bacterial and archaeal structure lead to function, how metabolic processes are regulated.</li><li>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.</li><li>5. Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement</li><li>6. The students will be able to understand how the organisms communicate to the population by using various mechanisms.</li></ol>
3.	19MBP103	Molecular Genetics	<ol style="list-style-type: none"><li>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.</li><li>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.</li><li>3. A thorough understanding of the process of translation and operons along with recombination of DNA.</li><li>4. An in-depth study of mutagenesis and genetic analysis with gene mapping.</li><li>5. Have a conceptual knowledge about DNA as a genetic material, enzymology, and replication</li></ol>

			<p>strategies.</p> <p>6. Full understanding of all aspects of all-important techniques used for the study of biomolecules.</p>
4.	19MBP104	Bioinstrumentation	<ol style="list-style-type: none"> <li>1. This enables students to be able to explain bioinstrumentation techniques, design and application.</li> <li>2. To know the concepts and operation of various lab instruments and related terms.</li> <li>3. Acquire knowledge and lab skills to perform experiments in laboratory.</li> <li>4. Connect the concepts of physics, chemistry and engineering principles in the instrumentation.</li> <li>5. The students will be able to know all the basic principles, technology and applications of various instruments in life science.</li> <li>6. Comprehend the techniques and the underlying principles in bioinstrumentation.</li> </ol>
5.	19MBP105A	Marine Microbiology	<ol style="list-style-type: none"> <li>1. Capable of describing and explaining both biological interaction processes and their importance to ecosystems.</li> <li>2. To acquire knowledge of the most common research methods used to develop our knowledge of biological processes.</li> <li>3. learn to work independently in collecting and analysing scientific data, both in the field and in the laboratory.</li> <li>4. Understand the architecture of marine ecosystem and its essential role</li> <li>5. Specify the biological significance of biomolecules in metabolism</li> <li>6. To understand computer applications and Bioinformatics</li> </ol>
6.	19MBP105B	Computer Applications And Bioinformatics	<ol style="list-style-type: none"> <li>1. The students will have an understanding about the information on the search engines and various software tools involved in bioinformatics.</li> <li>2. Additional knowledge on different operating systems would enable the candidate to work with versatility.</li> <li>3. Provides computational skill on search engines and various software tools involved in bioinformatics</li> <li>4. It will impart computational based techniques which includes genomics and proteomics in Bioinformatics.</li> <li>5. Retrieve information from available databases and use them for microbial identifications and drug designing</li> <li>6. Gain ability to modify gene and protein structures in simulated systems</li> </ol>
7.	19MBP105C	Biochemistry	<ol style="list-style-type: none"> <li>1. Understand the structures of enzymes, proteins, carbohydrates and fats</li> <li>2. Understand the functions of biomolecules</li> <li>3. Analyze the process of metabolism</li> <li>4. Understand of nucleic acids and their importance to combine and analyses information.</li> <li>5. Explain the structure and mechanism of enzyme</li> </ol>

			<p>action</p> <p>6. Summarize the DNA &amp; RNA structure and base pairing schemes</p>
8.	19MBP111	Basic Practical – I	<ol style="list-style-type: none"> <li>1. A student able to skilfully isolate and identify the microorganisms using different microbiological techniques needed in laboratory.</li> <li>2. To enhance the ability of the student skills in medical laboratories and research sectors.</li> <li>3. Demonstrate practical skills in the use of tools, technologies and methods common to microbiology.</li> <li>4. To apply the scientific method and hypothesis testing in the design and execution of experiments</li> <li>5. To develop theoretical and practical skills in the design and execution of experiments.</li> <li>6. Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.</li> </ol>
9.	19MBP112	Basic Practical – II	<ol style="list-style-type: none"> <li>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.</li> <li>2. Imparts knowledge on the different aspects of genetics and pedigree analysis.</li> <li>3. Students will apply their knowledge of to selected examples of changes or losses in cell function.</li> <li>4. Identify the organs and tissue systems of plants, and explain their respective function.</li> <li>5. Impart knowledge on applications of microorganisms in various fields</li> <li>6. Provides skill development on microbial products.</li> </ol>
10.	19MBP201	Virology	<ol style="list-style-type: none"> <li>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.</li> <li>2. Define the process of virus latency and describe in molecular terms control of the process and activation of viral genomes during reactivation.</li> <li>3. Describe the growth behaviour differences between normal cells and cells transformed by oncogenic DNA and RNA viruses.</li> <li>4. Integrate experimental strategies learned in the context of viral systems into the design of experiments involving other systems.</li> <li>5. Discern the replication strategies of representative viruses from the seven Baltimore classes</li> <li>6. To understand the interactions between viruses and the host immune system</li> </ol>
11.	19MBP202	Medical Bacteriology	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.</li> <li>2. Application of molecular techniques to medical microbiology; biochemical and genetic</li> </ol>

			<p>mechanisms of antimicrobial agent activity, microbial susceptibility and resistance to antimicrobial agents.</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>6. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.</li> </ol>
12.	19MBP203	Biostatistics And Research Methodology	<ol style="list-style-type: none"> <li>1. Apply basic statistical concepts commonly used in health and medical sciences</li> <li>2. Use basic analytical techniques to generate results</li> <li>3. Interpret results of commonly used statistical analyses in written summaries.</li> <li>4. Demonstrate statistical reasoning skills correctly and contextually and this course will support the employment in various bioscience sector.</li> <li>5. The analytics of data, probability, and hypothesis testing of samples</li> <li>6. The essential role of statistics in present, future use and applications of Biology</li> </ol>
13.	19MBP204	Environmental And Agricultural Microbiology	<ol style="list-style-type: none"> <li>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.</li> <li>2. Students able to know detailed idea about biofertilizer production and plant disease.</li> <li>3. Students able to become Entrepreneur after understanding this process and product development.</li> <li>4. This course will determine microbial role in nutrient cycling</li> <li>5. This course can able to determine water quality.</li> <li>6. It will explain the degradation of natural organic compounds and selected pollutants in the environment.</li> </ol>
14.	19MBP205A	Cell Biology	<ol style="list-style-type: none"> <li>1. Students upon completion of this paper will have clear knowledge on various cellular functions such as transportation and signalling.</li> <li>2. It will enable the students to enter into cellular function level research for their future.</li> <li>3. Students will understand the cellular components underlying mitotic and meiotic cell division.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.</li> <li>5. Students will get the knowledge of common and advanced laboratory practices in cell and molecular biology</li> <li>6. Conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation, enzyme engineering, Application of enzymes in large scale industrial processes</li> </ol>
15.	19MBP205B	Quality Assurance And Quality Control	<ol style="list-style-type: none"> <li>1. Set up and Assess Food Quality Assurance Plans.</li> <li>2. Create and Critically Evaluate quality specifications for raw materials, and associated final product and appropriate packaging.</li> <li>3. Design and critically evaluate appropriate testing and recording procedures for raw materials and associated Final product.</li> <li>4. Design, and evaluate processing documentation including Standard Operating procedures.</li> <li>5. To realize the importance of significance of quality</li> <li>6. Identify requirements of quality improvement programs</li> </ol>
16.	19MBP205C	Bioprocess Engineering	<ol style="list-style-type: none"> <li>1. This course will enable the students to design the various microbial fermentation products and their production, purification for various applications</li> <li>2. To know the process protocol for the, synthesis and characterization of nanoparticles</li> <li>3. Explain the gene transfer methods for the production of transgenic animals</li> <li>4. Gain experimental knowledge to perform animal biotechnology related experiments</li> <li>5. Explain the application of biotechnology in medical and its allied fields, gene therapy, genetic counseling</li> <li>6. Address the bioethical issues &amp; concerned linked to medical biotechnology</li> </ol>
17.	19MBP211	Advanced Practical – III	<ol style="list-style-type: none"> <li>1. This practical course renders a candidate the knowledge of advanced techniques involved in Microbial Biotechnology and Agricultural Microbiology.</li> <li>2. Candidates would be able to understand and perform molecular techniques which forms an integral part of core Microbiology.</li> <li>3. This practical course renders a candidate the knowledge of advanced techniques involved in microbial biotechnology.</li> <li>4. He/she will be able to judge how microbes and enzymes could be applied in industry.</li> <li>5. Candidates would be skilled enough to perform a molecular technique which forms an integral part of industrial microbiology.</li> <li>6. Students can develop entrepreneur skills for applications in biotechnology based industries.</li> </ol>
18.	19MBP212	Advanced Practical – IV	<ol style="list-style-type: none"> <li>1. This course provides the current medical aspects on the clinical diagnosis of infection providing the</li> </ol>

			<p>combined treatment of bacteriology and virology.</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>4. The significance of bacterial genetic variation (in drug resistance, pathogenesis or virulence and variation, diagnosis, and vaccination), and manipulation of cloned DNA.</li> <li>5. To know the Virulence of bacteria, bacterial virulence factors and their regulation.</li> <li>6. To understand drug resistance, drug-bacteria relationship, clinical implications, and prevention</li> </ol>
19.	19MBP301	Advanced Immunology	<ol style="list-style-type: none"> <li>1. To strengthen the technical skill on the immune system, their structure and classification, genetic control of antibody production, Types, structure of antigens and immunodiagnostics.</li> <li>2. To obtain knowledge of through Molecular immunology, hypersensitive immune reaction and Latest trends in immunology.</li> <li>3. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity.</li> <li>4. Develop understanding about immune system, antigen antibody interactions.</li> <li>5. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.</li> <li>6. Introducing the employment aspect of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.</li> </ol>
20.	19MBP302	Food Microbiology	<ol style="list-style-type: none"> <li>1. Provides knowledge in the large-scale production of industrial product, providing the trends to cater the needs of industry.</li> <li>2. This will help the students to enhance their employment knowledge on microbiology based commercial products.</li> <li>3. The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.</li> <li>4. To encode the importance of the role of microorganisms in food industries both in beneficial and harmful ways.</li> <li>5. 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.</li> </ol>

			6. Explain why microbiological quality control programmes are necessary in food production.
21.	19MBP303	Medical Mycology And Parasitology	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.</li> <li>2. Application of molecular techniques to medical microbiology; biochemical and genetic mechanisms of antimicrobial agent activity, microbial susceptibility and resistance to antimicrobial agents.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>6. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.</li> </ol>
22.	19MBP304	Microbial Technology And Intellectual Property Rights	<ol style="list-style-type: none"> <li>1. To learn the basic tools in recombinant technology</li> <li>2. To understand the various concepts of cloning vectors</li> <li>3. To learn the cloning strategies</li> <li>4. To familiarize the students, with the principles of bioethical concepts</li> <li>5. To emphasize on IPR issues and need for knowledge in patents in biotechnology</li> <li>6. To apply their knowledge in new product development</li> </ol>
23.	19MBP305A	Biofertilizer And Biomanure Technology	<ol style="list-style-type: none"> <li>1. This course has been designed to provide the student knowledge about eco-friendly product.</li> <li>2. Product play a crucial role in determining its future use and applications in environmental management.</li> <li>3. Provides detailed idea about biofertilizer production and plant disease.</li> <li>4. To produce and impart training of eco-friendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.</li> <li>5. To demonstrate the know-how technology pertinent to microbiological and physico-chemical analyses of soil samples and their assessment.</li> <li>6. Provides detailed entrepreneurial idea about biofertilizer production and plant disease.</li> </ol>
24.	19MBP305B	Laboratory Animal Care	<ol style="list-style-type: none"> <li>1. Laboratory animal care provides the proper handling and care for various species of animals used in research, testing, and in education.</li> </ol>

			<ol style="list-style-type: none"> <li>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.</li> <li>3. This course content will enhance the employment in drug testing field.</li> <li>4. Validation for equipment, methods, cleaning and process</li> <li>5. Students can develop their entrepreneurial skills in analysis of pens design and environment.</li> <li>6. Ethical knowledge for use of animals in research.</li> </ol>
25.	19MBP305C	Bio Nanotechnology	<ol style="list-style-type: none"> <li>1. Students get an idea about application of nanotechnology in biology.</li> <li>2. It provide analytical knowledge of trends and developments in the field of nanotechnology</li> <li>3. Acquire knowledge in nanotechnology and how it will support the employment greatly.</li> <li>4. Students able to construct hierarchy strategy in machine.</li> <li>5. Able to describe self-application and machine phase biotechnology.</li> <li>6. Students have an enhanced knowledge and understanding of chemical transformation and biomolecular sensing.</li> </ol>
26.	19MBP311	Application Oriented Practical – V	<ol style="list-style-type: none"> <li>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.</li> <li>2. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity</li> <li>3. Develop understanding about immune system, antigen antibody interactions.</li> <li>4. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.</li> <li>5. After course completion, students can apply the knowledge in further studies and higher education.</li> <li>6. Introducing the science of immunology and to study various types of immune systems their classification structure and mechanism of immune activation</li> </ol>
27.	19MBP312	Application Oriented Practical – VI	<ol style="list-style-type: none"> <li>1. This practical adds a technical skill and good understanding of industrial microbiology</li> <li>2. Students can develop the skills of an efficient microbiologist in food and beverage industries.</li> <li>3. Provides necessary entrepreneurial information on the food, dairy Microbiology in safety and quality perspective.</li> <li>4. It will help to study the importance in the prevention of contamination that might be caused by the microorganisms.</li> <li>5. To Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries</li> </ol>

			6. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation
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Name of the Department: **Physics**

**Course:** B.Sc. Physics

<b>Sl. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Course Outcomes</b>
1.	19PHU101	Mechanics	After successful completion of the course, the student is expected to <ol style="list-style-type: none"><li>1. To enable the students to understand the basic concepts of mechanics</li><li>2. To understand the concepts of simple harmonic motion</li><li>3. Parameters defining the motion of mechanical systems and their degrees of freedom.</li><li>4. Study the interaction of forces between solids in mechanical systems.</li><li>5. Application of the vector theorems of mechanics and interpretation of their results.</li><li>6. Introduction to analytical mechanics as a systematic tool for problem solving.</li></ol>
2.	19PHU102	Properties of Matter and Acoustics	After successful completion of the course, the student is expected to <ol style="list-style-type: none"><li>1. Understanding the fundamental laws and principles of different areas of physics.</li><li>2. To know the basic principles of properties of matter.</li><li>3. To gain knowledge in the concepts of Gravitation, Osmosis and Diffusion</li><li>4. Learn the basics of properties of matter, how Young's modulus and rigidity modulus are defines and how they are evaluated for</li><li>5. evaluate for different shapes of practical relevance</li><li>6. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.</li></ol>
3.	19PHU103	Mathematics - I	On successful completion of this course, the students will be able to <ol style="list-style-type: none"><li>1. Solve simultaneous equations with the help of matrices.</li><li>2. Mastery in the concepts of vector and scalar fields.</li><li>3. Gain the intellectual knowledge of complex functions and their applications.</li><li>4. Acquire fundamental knowledge in the techniques of differentiation.</li><li>5. Know the properties of definite integrals.</li><li>6. Acquire fundamental knowledge in Divergence of a vector</li></ol>
4.	19PHU111	Mechanics Practical	After successful completion of the course, the student is expected to <ol style="list-style-type: none"><li>1. Understand and analyze basic theory and principles of forces in mechanics</li><li>2. Know forces their relationship to engineering applications</li><li>3. Analyze motion, forces and motion, work and energy problems and their relationship to engineering applications</li></ol>

			<ol style="list-style-type: none"> <li>4. Understand basic laws governing mechanics of a system.</li> <li>5. Determine the acceleration due to gravity using various methods.</li> <li>6. Determine the Moment of Inertia using various methods.</li> </ol>
5.	19PHU112	Properties of Matter and Acoustics Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Study the elastic behavior and working of torsional pendulum.</li> <li>2. Study the bending behavior of beams and analyse the expression for young's modulus.</li> <li>3. Understand about the surface tension and viscosity of fluid.</li> <li>4. Use different methods to determine the Young's modulus of different materials.</li> <li>5. Use different methods to determine the Rigidity modulus of different materials.</li> <li>6. Experience the practical knowledge on different matters.</li> </ol>
6.	19PHU113	Mathematics Practical – I	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Solve complicated matrix related problems like matrix inverse and matrix multiplication.</li> <li>2. Acquire problem-solving skills through computer programming.</li> <li>3. Plot various functions and parametric curves.</li> <li>4. Solve the differential equations for physics problems</li> <li>5. Gain the intellectual knowledge of complex functions and their applications.</li> <li>6. Apply the mathematical concepts to physics problems with the aid of computer programming</li> <li>7. Solve the geometry of the and plot variations of complex functions.</li> </ol>
7.	19PHU201	Electricity and Magnetism	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.</li> <li>2. Gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.</li> <li>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.</li> <li>4. Be able to use electromagnetic theory and principles in a wide range of applications.</li> <li>5. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.</li> <li>6. To develop an understanding of the principles of electricity and magnetism.</li> </ol>
8.	19PHU202	Analog Systems and Applications	<p>After successful completion of the course, the student is expected to</p>

			<ol style="list-style-type: none"> <li>1. To apply concepts for the design of Regulators and Amplifiers.</li> <li>2. acquire knowledge about how a semiconductor diode rectifies an input ac signal</li> <li>3. To verify the theoretical concepts through laboratory and simulation experiments.</li> <li>4. Be able to know about the Field Effect Transistors, their principles and applications</li> <li>5. Learn how to construct a transistor amplifier and how its gain varies with frequency</li> <li>6. To implement mini projects based on concept of electronics circuit concepts.</li> </ol>
9.	19PHU203	Mathematics - II	<p>On successful completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Appreciate the physical significance of Fourier series</li> <li>2. Understand the mathematical principles on transforms and their application in physics.</li> <li>3. Apply mathematical foundation to formulate and solve problems arising in physics</li> <li>4. Synthesize numerical techniques for practical problems</li> <li>5. Solve the numerical problem for physics</li> <li>6. Apply the numerical methods to solve the real life problem</li> </ol>
10.	19PHU211	Electricity and Magnetism Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. To gain practical knowledge on RC Circuit</li> <li>2. Develop skills in the basic concept of electric forces.</li> <li>3. To understand Gauss law and its applications.</li> <li>4. To gain practical knowledge on magnetic moment.</li> <li>5. Determine a Low Resistance by Carey Foster's Bridge</li> <li>6. Compare capacitances using De'Sauty's bridge</li> </ol>
11.	19PHU212	Analog Systems and Applications Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Understand the basics of diode</li> <li>2. Analyse the characteristics of Bipolar Junction Transistor</li> <li>3. Perform the procedures for the working of RC-coupled transistor</li> <li>4. Analyse the relationship between V-I &amp; power curves</li> <li>5. Understand the applications of Op-amp</li> <li>6. Develop the ability to analyze and design analog electronic circuits using discrete components.</li> <li>7. Acquire a basic knowledge in solid state electronics including diodes, MOSFET, BJT, and operational amplifier</li> </ol>
12.	19PHU213	Mathematics Practical – II	<p>On successful completion of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Familiarize with the programming environment for numerical methods.</li> <li>2. Develop proficiency in skills to solve the algebraic equations.</li> <li>3. Evaluate the definite integrals using computer programming techniques</li> <li>4. Find the solution through programming.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Write the coding for physical problems</li> <li>6. Solve complex problems through modeling.</li> </ol>
13.	19AEC201	Environmental Studies	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> <li>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.</li> </ol>
14.	19PHU301	Thermal Physics & Statistical Mechanics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions.</li> <li>2. Realize the importance of Thermo dynamical functions and their applications.</li> <li>3. Statistical physics methods, such as Boltzmann distribution, Gibbs distribution,</li> <li>4. Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems.</li> <li>5. Become familiar with various thermodynamic process and work done in each of this process.</li> <li>6. Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.</li> <li>7. Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.</li> </ol>
15.	19PHU302	Physics of Electronic Devices and Circuits	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Understand the construction and working of different semiconductor devices.</li> <li>2. Study about Basics electronics Technology</li> </ol>

			<ol style="list-style-type: none"> <li>3. Develop explicit problem-solving strategies that emphasize qualitative analysis steps to describe and clarify the problem.</li> <li>4. Develop knowledge on design trade-offs in various digital electronic families with a view towards reduced power consumption</li> <li>5. Realize the importance of different electronic communication systems.</li> <li>6. Design power electronic circuit for real time application like rectifier and convertor etc.</li> </ol>
16.	19PHU303A	Renewable Energy and Energy Harvesting	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.</li> <li>2. Understand the concept of hydro energy resources and their classification.</li> <li>3. 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.</li> <li>4. Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.</li> <li>5. Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications.</li> <li>6. Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.</li> </ol>
17.	19PHU303B	Physics Workshop Skill	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Acquire knowledge about various types of wiring systems, wiring tools, lighting &amp; wiring accessories, wiring estimation &amp; costing, etc.</li> <li>2. To get familiarized with the welding process.</li> <li>3. Understand the concept of machining, forming and welding process.</li> <li>4. Develop knowledge on Operation of oscilloscope.</li> <li>5. Acquire knowledge about household electrical appliances, electric shock, etc.</li> <li>6. To get familiarized with the properties of different materials- metals and non-metals</li> </ol>
18.	19PHU304	Chemistry – I	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. The molecular orbital theory, preparation and properties of inorganic compounds.</li> <li>2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.</li> <li>3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.</li> <li>4. Elements of photochemistry, chemical kinetics and chromatography.</li> <li>5. About the dyes, chemotherapy and vitamins.</li> </ol>

			6. Implement the theory knowledge in to practical to produce compounds.
19.	19PHU311	Thermal Physics and Statistical Mechanics Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Understand the process of thermal conductivity, viscosity and diffusion in gases</li> <li>2. Able to correlate theory and practical.</li> <li>3. Understand the basic thermal properties via experiments.</li> <li>4. Verify the Newton's law.</li> <li>5. Analyze the characteristics of Bipolar Junction Transistor</li> <li>6. Understand the applications of thermal conduction materials.</li> <li>7. Apply the laws of thermodynamics to real physical systems and processes.</li> <li>8. Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.</li> </ol>
20.	19PHU312	Physics of Electronic Devices And Circuits Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. By the end of this subject, students should have acquired reasonable proficiency in the analysis and design of basic electronic circuits.</li> <li>2. Apply the concepts of basic electronic devices to design various circuits.</li> <li>3. Understand operation of diodes, transistors in order to design basic circuits.</li> <li>4. Design small and large signal amplifier circuits for various practical applications.</li> <li>5. The course as a whole outline some ways of thinking about analog circuits that hopefully will help to develop intuition.</li> <li>6. Design, fabricate and test small electronic circuit.</li> </ol>
21.	19PHU313A	Renewable Energy and Energy Harvesting Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Demonstrate Training modules on solar energy, wind energy, etc.</li> <li>2. Convert units of energy-to quantify energy demands and make comparisons among energy uses, resources, and technologies.</li> <li>3. Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.</li> <li>4. Understand the needs of renewable energy sources.</li> <li>5. Experience the calculation of wind velocity.</li> <li>6. Study of box type solar cooker.</li> </ol>
22.	19PHU313B	Physics Workshop Skill Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Develop skills in assessing the quality of one's own and others' work</li> <li>2. Develop skills in observation, interpretation, reasoning, synthesis, generalizing, predicting, and questioning as a way to learn new knowledge.</li> <li>3. Use the multimeters and other electronic kits.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Operate the oscilloscope and PCB.</li> <li>5. Make different shape of materials using foundry tools.</li> <li>6. Construct the circuit of regulated power supply. Timer circuit, Electronic switch using transistor and relay.</li> </ol>
23.	19PHU314	Chemistry Practical – I	<p>On successful completion of the course the students should have</p> <ol style="list-style-type: none"> <li>1. Learnt about the qualitative analysis of organic compounds.</li> <li>2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.</li> <li>3. Gain knowledge on basic test of organic compounds.</li> <li>4. Differentiate the chemicals and their families.</li> <li>5. Identify the compound whether it is aromatic or aliphatic.</li> <li>6. Confirm different functional group by confirmation studies.</li> </ol>
24.	19PHU401	Wave and Optics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. To develop an understanding of the principles of optics.</li> <li>2. Understand linear, time-invariant systems.</li> <li>3. Understand the role of the wave equation and appreciate the universal nature of</li> <li>4. wave motion in a range of physical systems</li> <li>5. To build connections between mathematical development and conceptual understanding.</li> <li>6. Understand dispersion in waves and model dispersion using Fourier theory.</li> <li>7. Understand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model.</li> </ol>
25.	19PHU402	Nuclear and Particle Physics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Determine the charge, mass of any nucleus by using various spectrograph.</li> <li>2. They are able to understand the size of nucleus and all its properties.</li> <li>3. Develop and communicate analytical skills in subatomic physics.</li> <li>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.</li> <li>5. Acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly used in this area.</li> <li>6. Students now know various methods of accelerating various types of particles to perform scattering experiments.</li> </ol>
26.	19PHU403A	Basic Instrumentation Skill	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Develop skills to impart practical knowledge in real time solutions.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.</li> <li>3. Understand the terminology used in various instruments.</li> <li>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.</li> <li>5. Connect concepts with the instruments to enhance understanding.</li> <li>6. Understand measurement technology, usage of new instruments and real time applications in engineering studies.</li> </ol>
27.	19PHU403B	Radiation Safety	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. List and describe the function the parts of the x-ray machine</li> <li>2. Describe the spectrum of electromagnetic radiation.</li> <li>3. Understand the terminology used in radiation safety.</li> <li>4. Gain knowledge of new concept in the field of radiation.</li> <li>5. They are able to understand the Interaction of Radiation with matter.</li> <li>6. Impact knowledge on different radiation detector.</li> </ol>
28.	19PHU404	Chemistry – II	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. The student understands the metallurgy of metals and the theories of coordination compounds</li> <li>2. The industrial importance of EDTA, hemoglobin and chlorophyll.</li> <li>3. Understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.</li> <li>4. Understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.</li> <li>5. Understand the concepts of first and second laws of thermodynamics.</li> <li>6. Understand the fundamentals of electrochemistry.</li> </ol>
29.	19PHU411	Wave and Optics Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Gain knowledge on various theories of light.</li> <li>2. Acquire skills to identify and apply formulas of optics and wave physics.</li> <li>3. Understand the properties of light like reflection, refraction, interference, and diffraction etc.,</li> <li>4. Understand the applications of diffraction and polarization.</li> <li>5. Determine the different optical properties by using various apparatus.</li> <li>6. Know the importance of optical materials in the industrials.</li> </ol>
30.	19PHU412	Nuclear and Particle Physics Practical	<p>After successful completion of the course, the student is expected to</p>

			<ol style="list-style-type: none"> <li>1. Acquire basic knowledge about nuclear and particle physics</li> <li>2. Develop the nuclear reactions and neutron physics.</li> <li>3. Know the calculations of <math>e/m</math> and their applications.</li> <li>4. Understand the operation of G.M. counter</li> <li>5. Verify the B-H curve of radiative materials.</li> <li>6. Understand the difference between Magnetron and Thomson methods.</li> </ol>
31.	19PHU413A	Basic Instrumentation Skill Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Handle any kind of process by framing it in block diagram, mathematical model and different process variables.</li> <li>2. Use modern engineering tools and techniques in the practice of electronic devices.</li> <li>3. Know all the industrial processes and demonstrate their knowledge in designing the control loops for these processes.</li> <li>4. Understand the working of various types of amplifiers, oscillators, wave shaping and power supply circuits</li> <li>5. Design and Analyze the various types of amplifiers, oscillators, wave shaping and power supply circuits for any practical situation.</li> <li>6. Discuss the terms, principle, instrumentation, operation and applications of instruments.</li> </ol>
32.	19PHU413B	Radiation Safety Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Understood the concepts of nuclear radiation.</li> <li>2. Know the interaction of nuclear radiation with matter.</li> <li>3. Detect the nuclear radiation.</li> <li>4. Be familiar with dosimeters and measurements.</li> <li>5. Know the importance of background radiation levels using Radiation meter.</li> <li>6. Identify the <math>\alpha</math> particles using reference source &amp; determining its half-life using spark counter.</li> </ol>
33.	19PHU414	Chemistry Practical– II	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Learnt about the qualitative analysis of organic compounds.</li> <li>2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.</li> <li>3. Gain knowledge on basic test of organic compounds.</li> <li>4. Differentiate the chemicals and their families.</li> <li>5. Estimate the Acidimetry &amp; Alkalimetry by volumetric analysis</li> <li>6. Experience the practical knowledge of Acidimetry &amp; Alkalimetry, Permanganometry</li> </ol>
34.	19PHU501	Mathematical Physics - I	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. To communicate mathematical and physical knowledge and ideas to the students.</li> <li>2. Get introduced to Special functions like Gamma function, Beta function, Delta function, Bessel functions and their recurrence relations</li> </ol>

			<ol style="list-style-type: none"> <li>3. Learn the fundamentals and applications of Complex Variable, Analyticity, Cauchy- Riemann and Cauchy's Integral.</li> <li>4. Build connections between mathematical development and conceptual understanding.</li> <li>5. Understand the relationship between observation and theory and their use in building the basic concepts of computing.</li> <li>6. To contribute innovations and application of basic research.</li> </ol>
35.	19PHU502	Electromagnetic Wave Propagation	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.</li> <li>2. Be able to use electromagnetic wave theory and principles in a wide range of applications.</li> <li>3. Gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.</li> <li>4. Solve simple electrostatic boundary problems.</li> <li>5. Describe simple models for electromagnetic interaction with media</li> <li>6. Be able to choose adequate models and solution methods for specific problems.</li> </ol>
36.	19PHU503A	Elements of Modern Physics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. recall and apply knowledge in the areas of optics and waves, special relativity and</li> <li>2. quantum physics (developing the knowledge capability dimension); analyze and solve problems in these areas (developing the critical analysis and problem-solving capability dimension);</li> <li>3. Understand the relationship between observation and theory and their use in building the basic concepts of modern physics.</li> <li>4. Understand how major concepts developed and changed over time.</li> <li>5. Capable of analyzing and solving problems using oral and written reasoning skills based on the concepts of modern physics.</li> <li>6. Conduct relevant experiments, analyze data and report results in written form (developing the technical capability and communication dimensions).</li> </ol>
37.	19PHU503B	Medical Physics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Define medical imaging techniques specified in the syllabus below and know where they are applied in clinical practice.</li> <li>2. Apply a knowledge of x-ray systems and physics to analyze and compare the performance of different medical x-ray imaging systems.</li> <li>3. Describe (and create) target and region at risk planning volumes.</li> <li>4. Describe the capabilities of the Clinical Trials Processing application.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Understand the biological consequences of radiation damage.</li> <li>6. Describe how ionizing radiation interacts with matter, how it affects living organisms and how it is used as a therapeutic technique.</li> </ol>
38.	19PHU504A	Computational Skill	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Demonstrate basic knowledge of numerical methods.</li> <li>2. Demonstrate basic programming skills.</li> <li>3. demonstrate an understanding of the applicability of numerical methods for modeling</li> <li>4. Physical systems and its advantages and disadvantages.</li> <li>5. Demonstrate the ability to estimate the errors in the use of numerical methods.</li> <li>6. Demonstrate skills to write and develop simple programs in FORTRAN.</li> <li>7. Understand the Importance of graphical analysis and its limitations.</li> </ol>
39.	19PHU504B	Weather Forecasting	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Ecosystems and climate interactions</li> <li>2. Effects of climate change on life cycles</li> <li>3. Biodiversity, Weather vs climate</li> <li>4. The greenhouse effect, Treaty rights</li> <li>5. Traditional ecological knowledge</li> <li>6. Understand the climate change and related issues.</li> </ol>
40.	19PHU511	Mathematical Physics - I Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. To communicate mathematical and physical knowledge and ideas to the students.</li> <li>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.</li> <li>3. Evaluate the definite integrals using computer programming techniques</li> <li>4. Find the solution through programming languages.</li> <li>5. Write the coding for physical problems</li> <li>6. Solve complex problems through modeling.</li> </ol>
41.	19PHU512	Electromagnetic Wave Propagation Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. find electric and magnetic fields from stationary and dynamic charge and current distributions.</li> <li>2. describe simple models for electromagnetic interaction with media</li> <li>3. be able to choose adequate models and solution methods for specific problems.</li> <li>4. Operate the polarimeter to find the polarization behavior of liquid and crystalline materials.</li> <li>5. Calculate the wavelength of monochromatic source Young's double slit method.</li> <li>6. Verify the Faraday's law of electromagnetism</li> </ol>

42.	19PHU513A	Elements of Modern Physics Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Recall and apply knowledge in the areas of optics and waves, special relativity and quantum physics (developing the knowledge capability dimension);</li> <li>2. Conduct relevant experiments, analyse data and report results in written form (developing the technical capability and communication dimensions).</li> <li>3. Analyse the plank's constant using different experimental technique.</li> <li>4. Find the wavelength of any laser sources.</li> <li>5. Differentiate the interference and diffraction properties by the experiments.</li> <li>6. Understand the theory and practical knowledge of light and other properties.</li> </ol>
43.	19PHU513B	Medical Physics Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Different areas of research in Medical Physics</li> <li>2. Understand and apply key concepts specific to energy deposition for both ionizing photon interactions and transport in matter</li> <li>3. Know the energetic charged particle interactions and transport in matter.</li> <li>4. Understanding the working of a manual optical eye-testing machine</li> <li>5. Familiarization with the Use of a Vascular Doppler.</li> <li>6. Realize the real time examples of medical instruments.</li> </ol>
44.	19PHU514A	Computational Skill Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Demonstrate basic knowledge of numerical methods.</li> <li>2. Demonstrate basic programming skills.</li> <li>3. demonstrate an understanding of the applicability of numerical methods for modeling Physical systems and its advantages and disadvantages.</li> <li>4. Solve the problems by computing.</li> <li>5. Understand the differences of theory, computing and experiments.</li> <li>6. Solve the complex equations using different software packages.</li> </ol>
45.	19PHU514B	Weather Forecasting Practical	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Know the idea on Ecosystems and climate interactions</li> <li>2. Know the Effects of climate change on life cycles</li> <li>3. Know the Biodiversity, Weather vs climate</li> <li>4. Understand the greenhouse effect, Treaty rights</li> <li>5. understand traditional ecological knowledge</li> <li>6. understand the importance of weather changes.</li> </ol>
46.	19PHU601	Mathematical Physics -II	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. To know elementary ideas in linear algebra, special functions and complex analysis.</li> <li>2. Learn different ways of solving second order differential equations</li> </ol>

			<ol style="list-style-type: none"> <li>3. Learn the fundamentals and applications of Fourier series, Fourier and Laplace transforms, their inverse transforms etc.,</li> <li>4. Students can be able to apply these concepts to solve problems in classical, statistical and quantum mechanics as well as electromagnetism.</li> <li>5. Learn about special type of matrices that are relevant in physics and then learn about tensors.</li> <li>6. Learn different ways of solving group theory equations</li> </ol>
47.	19PHU602	Solid State Physics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. be able to account for interatomic forces and bonds.</li> <li>2. have a basic knowledge of crystal systems and spatial symmetries.</li> <li>3. be able to account for how crystalline materials are studied using diffraction, including concepts like form factor, structure factor, and scattering amplitude.</li> <li>4. know what phonons are, and be able to perform estimates of their dispersive and thermal properties.</li> <li>5. be able to calculate thermal and electrical properties in the free-electron model.</li> <li>6. be able to explain superconductivity using BCS theory</li> <li>7. be able to outline the importance of solid-state physics in the modern society.</li> </ol>
48.	19PHU603A	Nano Materials and Applications	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Explain the fundamental principles of nanotechnology and their application to biomedical engineering.</li> <li>2. Apply engineering and physics concepts to the nano-scale and non-continuum domain.</li> <li>3. Identify and compare state-of-the-art nanofabrication methods</li> <li>4. Perform a critical analysis of the research literature.</li> <li>5. Design processing conditions to engineer functional nanomaterials.</li> <li>6. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.</li> </ol>
49.	19PHU603B	Biological Physics	<p>After successful completion of the course, the student is expected to</p> <ol style="list-style-type: none"> <li>1. Demonstrate knowledge of the fundamental concepts in physics and chemistry that underlie biological processes.</li> <li>2. Define the structural characteristics of nucleic acids and proteins</li> <li>3. examine parameters that variously determine their stability and function(s).</li> <li>4. Describe the principles that govern biomolecular interactions</li> <li>5. appreciate how established methods of research and enquiry are employed to analyze the different aspects of these interactions.</li> <li>6. Understand the concept of life of molecules.</li> </ol>

50.	19PHU611	Mathematical Physics Practical – II	After successful completion of the course, the student is expected to <ol style="list-style-type: none"> <li>1. Communicate mathematical and physical knowledge and ideas to the students.</li> <li>2. demonstrate the utility and limitations of a variety of powerful calculation techniques</li> <li>3. provide a deeper understanding of the mathematics underpinning theoretical physics.</li> <li>4. Write algorithm of numerical problems.</li> <li>5. Analytical thinking and correlation of the problems.</li> <li>6. Understand the interpretation of physical problems.</li> </ol>
51.	19PHU612	Solid State Physics Practical	After successful completion of the course, the student is expected to <ol style="list-style-type: none"> <li>1. Basic practical knowledge on magnetic materials.</li> <li>2. Understand the basic idea about the dielectric Properties of Solids</li> <li>3. Experience the behavior of Hysteresis loop of a crystal.</li> <li>4. Measure the susceptibility of magnetic materials.</li> <li>5. Verify the dielectric constant of a materials by experimentally.</li> <li>6. Understand the importance of new materials in modern technology.</li> </ol>
52.	19PHU613A	Nano Materials and Applications Practical	After successful completion of the course, the student is expected to <ol style="list-style-type: none"> <li>1. Understand the methods synthesis of nanomaterials</li> <li>2. Understand their application and the impact of nanomaterials on environment</li> <li>3. Apply their learned knowledge to develop Nanomaterials.</li> <li>4. Bring new materials to the society.</li> <li>5. Gain knowledge on different spectroscopic techniques.</li> <li>6. Apply their learned knowledge to develop the new devices.</li> </ol>
53.	19PHU613B	Biological Physics Practical	After successful completion of the course, the student is expected to <ol style="list-style-type: none"> <li>1. Students will function successfully in the laboratory and use safe laboratory practices.</li> <li>2. Students will critically evaluate data and design experiments to test hypotheses relevant to the practice of Biochemistry and Biophysics.</li> <li>3. Students will demonstrate awareness of ethical issues in the practice of science.</li> <li>4. Know the operation of medical instruments.</li> <li>5. Apply their knowledge to develop the instruments.</li> <li>6. Verify the basic principles and laws experimentally.</li> </ol>
54.	19PHU691	Project	After successful completion of the course, the student is expected to <ol style="list-style-type: none"> <li>1. Demonstrate a depth of knowledge of Physics.</li> <li>2. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.</li> <li>3. To apply his/her knowledge and skills to carry out advanced tasks and projects.</li> <li>4. Apply their knowledge to develop the instruments.</li> </ol>

			<ol style="list-style-type: none"><li>5. Verify the basic principles and laws experimentally as a project.</li><li>6. Demonstrate knowledge of contemporary issues in their chosen field of research.</li><li>7. Demonstrate an ability to present and defend their research work.</li></ol>
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Name of the Department: **Physics**

**Course:** M.Sc. Physics

<b>Sl. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Course Outcomes</b>
1.	19PHP101	Condensed Matter Physics	After completing the course students will/can able to <ol style="list-style-type: none"><li>1. Analyze the electronic, magnetic and thermal properties of materials.</li><li>2. Classify condensed matter upon its degree of order, with emphasis on scattering experiments.</li><li>3. Differentiate materials in a variety of applications.</li><li>4. Explain various types of magnetic phenomenon, physics behind them, their properties and applications.</li><li>5. Explain superconductivity, its properties, important parameters related to possible applications.</li><li>6. Develop the superconducting materials and understand the materials property the basic concept of superconductor</li></ol>
2.	19PHP102	Electronic Devices and Circuits	After completing the course students will/can able to <ol style="list-style-type: none"><li>1. Build, design and analyze analog to digital converter.</li><li>2. Design digital and analog systems.</li><li>3. Understand the basic operation and working of different diodes like FET, MOSFET, CMOS, etc.</li><li>4. Understand the high frequency application of diodes.</li><li>5. Analyze PN junctions in semiconductor devices under various conditions.</li><li>6. Design and analyze simple rectifiers and voltage regulators using diodes.</li></ol>
3.	19PHP103	Classical Mechanics and Relativity	After completing the course, the students will/ can able to <ol style="list-style-type: none"><li>1. Understand the classical laws of motion.</li><li>2. Compete in using the essential mathematical skills needed for describing mechanics and special relativity</li><li>3. Develop problem solving skills.</li><li>4. An appreciation of the influence of classical mechanics and relativity on modern scientific development.</li><li>5. Use the statistical physics methods, such as Boltzmann distribution, Fermi-Dirac and</li><li>6. Bose-Einstein distributions to solve problems in physical systems.</li></ol>
4.	19PHP104	Mathematical Physics	After completing the course, the students will / can able to <ol style="list-style-type: none"><li>1. Apply integral transform (Fourier and Laplace) to solve mathematical problems of Fourier transforms as an aid for analyzing experimental data.</li><li>2. Students can formulate and express a physical law in terms of tensors, and simplify it by use the</li></ol>

			<p>coordinate transforms (example: principal axes of inertia).</p> <ol style="list-style-type: none"> <li>Students will be able to solve some simple classical variation problems.</li> <li>Intuition of the physical meaning of the various vector calculus operators (div, grad, curl)</li> <li>Students can formulate and express a physical law in terms of tensors, and simplify it by use of coordinate transforms (example: principal axes of inertia).</li> <li>Solve some simple classical variation problems.</li> </ol>
5.	19PHP105A	Material Characterization	<p>After completing the course, the students will / can able to</p> <ol style="list-style-type: none"> <li>Handle with X-ray, thermal, microscopic, and electrical methods of characterization.</li> <li>Understand and describe the fundamental principles behind the methods of characterization which are included in the curriculum</li> <li>Analyze, interpret and present observations from the different methods.</li> <li>Evaluate the uncertainty of observations and results from the different methods.</li> <li>Understand the history of materials science with basic understanding of metals, binary alloys, magnetic materials, dielectric materials and polymers</li> <li>Understand nucleation, growth and phase transformation kinetics</li> </ol>
6.	19PHP105B	Astronomy and Astrophysics	<p>After completing the course, the students will / can able to</p> <ol style="list-style-type: none"> <li>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.</li> <li>Systematically evaluate relevant theory and concepts in astronomy and astrophysics,</li> <li>Relate these to appropriate methodologies and evidence and draw appropriate conclusions.</li> <li>Demonstrate capacity for astronomy and astrophysics reasoning through analyzing, proving and explaining concepts from the chosen research area.</li> <li>Identify important constellations – orient in space.</li> <li>Describe the planets of the solar system and their properties.</li> </ol>
7.	19PHP105C	Crystal Growth Techniques	<p>After completing the course, the students will / can able to</p> <ol style="list-style-type: none"> <li>The student will learn about the crystal growth mechanisms and techniques.</li> <li>Understand different crystals having a lot applications in electronics, energetics etc.</li> <li>Acquire the theoretical concept behind electrical and thermal properties of metals</li> <li>Understand the fundamental theories to describe the energy bands in metals</li> </ol>

			<ol style="list-style-type: none"> <li>5. Gain the knowledge about Semiconductor Crystals and their properties</li> <li>6. Gain the knowledge about phonons and its importance in thermal physics</li> </ol>
8.	19PHP111	General Physics Practical - I	<p>After completing the practical course students will/can able to</p> <ol style="list-style-type: none"> <li>1. Apply the analytical techniques and graphical analysis to the experimental data.</li> <li>2. Verify laws studied in the different theory course.</li> <li>3. Measure different properties of materials.</li> <li>4. classify the materials with the properties</li> <li>5. overcome the fear of experimental skill</li> <li>6. Capable to build his own equipments for measuring the properties of materials</li> </ol>
9.	19PHP112	Electronics Practical – I	<p>After completing the practical course students will/can able to</p> <ol style="list-style-type: none"> <li>1. Design and handle various instruments.</li> <li>2. Verify laws studied in the different theory course.</li> <li>3. Measure different properties of materials.</li> <li>4. Gain the knowledge in quantization of electromagnetic fields.</li> <li>5. Analyze the characteristics of oscillators and wave shaping circuits</li> <li>6. Understand the basic concepts of amplifiers and operational amplifier</li> </ol>
10.	19PHP201	Thermodynamics And Statistical Mechanics	<p>After completing the course students will/can able to</p> <ol style="list-style-type: none"> <li>1. Understand the classical laws of motion.</li> <li>2. Compete in using the essential mathematical skills needed for describing mechanics and special relativity</li> <li>3. Understand of significance of conservation of various physical quantities to discuss the motion of dynamical system.</li> <li>4. Understand of constraints and their significance to solve the equations of motion of the dynamical system.</li> <li>5. Understand of necessity of Lagrangian and Hamiltonian formulations for simplified treatments of many complex problems in classical mechanics.</li> <li>6. Develop problem solving skills in nonlinear dynamics.</li> </ol>
11.	19PHP202	Quantum Mechanics - I	<p>After completing the course, the students can/will able to</p> <ol style="list-style-type: none"> <li>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</li> <li>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</li> <li>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</li> </ol>

			<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>6. Calculating states of electrons in hydrogen atom and harmonic oscillators and the interpretation of quantum states</li> </ol>
12.	19PHP203	Nuclear Physics	<p>After completing the course, the students will / can able to</p> <ol style="list-style-type: none"> <li>1. Explain central concepts, laws and models in nuclear and particle physics.</li> <li>2. Interpret basic experiments using basic laws and relations to solve simple problems.</li> <li>3. Students understand the basic principle, type of accelerators, working and operation of accelerators.</li> <li>4. Learn the basic of ion sources, beam transport and application of accelerator in different branches of science.</li> <li>5. Get trained in research institute and academic Universities to handle such complicated machine such as reactors.</li> <li>6. Explore their knowledge in reactors to the atomic agency</li> </ol>
13.	19PHP204	SPECTROSCOPY	<p>After completing the course, the students will / can able to</p> <ol style="list-style-type: none"> <li>1. Understand the basic physical chemistry law that govern molecular spectroscopy</li> <li>2. Student will know basic information on molecular methods (IR, Raman, UV-VIS, NMR, EPR)</li> <li>3. Select molecular spectroscopy methods suitable for solving given scientific problem</li> <li>4. Analyze results of measurements using molecular spectroscopy</li> <li>5. Give a view of the modern experimental tools of Atomic- and Molecular Physics.</li> <li>6. Gain knowledge of the most common atomic and molecular spectroscopic methods and the atomic and molecular properties derived from those.</li> </ol>
14.	19PHP205A	Digital Signal Processing	<p>After completing the course, the students will/able to</p> <ol style="list-style-type: none"> <li>1. Determine the spectral coefficients and the Fourier series components of discrete-time signals.</li> <li>2. Determine the frequency response and the z-transform of discrete-time systems.</li> <li>3. Determine the discrete Fourier transform of discrete-time signals.</li> <li>4. Calculate the outputs of discrete-time systems in response to inputs.</li> <li>5. Understand the characteristics field effect transistors</li> <li>6. Analyze the characteristics of oscillators and wave shaping circuits</li> </ol>

15	19PHP205B	Computational Physics	<p>After completing the course, the students will/able to</p> <ol style="list-style-type: none"> <li>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).</li> <li>2. Analysis techniques for propagating error, representing data graphically. Create, solve and interpret basic mathematical tool.</li> <li>3. Program independently computers using leading-edge tools,</li> <li>4. formulate and computationally solve a selection of problems in physics,</li> <li>5. Use the tools, methodologies, language and conventions of physics to test and Communicate ideas and explanations.</li> <li>6. Identify and describe the characteristics of various numerical methods</li> </ol>
16.	19PHP205C	Thin Film Physics	<p>At the end of the course, the students can/will be able to</p> <ol style="list-style-type: none"> <li>1. Discuss the Differences and Similarities Between Different Vacuum Based Deposition Techniques</li> <li>2. Evaluate and Use Models for Nucleating and Growth of Thin Films</li> <li>3. Examine the Relation Between Deposition Technique, Film Structure, And Film Properties,</li> <li>4. Discuss Typical Thin Film Applications,</li> <li>5. Select Proper Deposition Techniques for Various Applications.</li> <li>6. Understand the Basic Concepts About the Thin Film Technology</li> <li>7. The Importance of Use of Thin Films in Application and Research.</li> </ol>
17.	19PHP211	General Physics Practical – II	<p>After the course the student will/ can able to</p> <ol style="list-style-type: none"> <li>1. Handle various difficult instruments.</li> <li>2. Verify laws studied in the different theory course.</li> <li>3. Measure different properties of materials.</li> <li>4. Classify the materials with the properties</li> <li>5. Overcome the fear of experimental skill</li> <li>6. Built his own equipments for measuring the properties of materials</li> </ol>
18.	19PHP212	Electronics Practical – II	<p>After completing the practical course, the students can / will able to</p> <ol style="list-style-type: none"> <li>1. Apply the analytical techniques and graphical analysis to the experimental data.</li> <li>2. Verify laws studied in the different theory course.</li> <li>3. Measure different properties of materials.</li> <li>4. Gain the knowledge in quantization of electromagnetic fields.</li> <li>5. Analyze the characteristics of oscillators and wave shaping circuits</li> <li>6. Understand the basic concepts of amplifiers and operational amplifiers</li> </ol>
19.	19PHP301	Quantum Mechanics – II	<p>After completing the course, the student will/can able to</p> <ol style="list-style-type: none"> <li>1. Get the knowledge of non-relativistic and relativistic quantum mechanics including Time dependent</li> </ol>

			<p>perturbation theory, scattering theory, relativistic wave equations, and second quantization.</p> <ol style="list-style-type: none"> <li>Understand concepts and to perform calculations of scattering of particles.</li> <li>Understand and evaluate modern research utilizing quantum theory in condensed matter, nuclear and particle physics.</li> <li>Acquire the basic knowledge on Eigen values and Eigen functions.</li> <li>Apply the Schrodinger wave equation to get Eigen values of bound systems</li> <li>Understand the matrix formulation in quantum mechanics.</li> <li>Acquire the basic knowledge on angular momentum of quantum mechanical systems</li> </ol>
20.	19PHP302	Laser and its Applications	<p>After completing the course, the students can/will able to</p> <ol style="list-style-type: none"> <li>Acquire fundamentals and principles of Laser action and Understand the basic concepts of different types of lasers</li> <li>Understand the absorption and spontaneous and stimulated emission in two level system,</li> <li>The effects of homogeneous and inhomogeneous line broadening, and the conditions for laser amplification.</li> <li>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.</li> <li>Classify fibers as single-mode, multimode step index and multi-mode graded index.</li> <li>Describe modes in multimode fibers and mode field parameter in single-mode fibers</li> </ol>
21.	19PHP303	Electromagnetic Theory and Electrodynamics	<p>After completing the course, the students will/can able to</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>Understand the theories and properties of electrostatics</li> <li>Analyze the interaction of electrostatic properties with matter.</li> <li>Acquire the fundamental knowledge in Magnetostatics</li> <li>Understand the basic concepts of electrodynamics</li> </ol>
22.	19PHP304	Digital Electronics and Microprocessor	<p>At the end of the course, Students can</p> <ol style="list-style-type: none"> <li>Acquire the basic knowledge of digital logic levels and application of digital electronics circuits.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Perform the analysis and design of various digital electronic circuits.</li> <li>3. Acquire knowledge about Microprocessors and its need.</li> <li>4. Able to identify basic architecture of different Microprocessors.</li> <li>5. Foster to write the programming using 8085 microprocessors.</li> <li>6. Foster to understand the internal architecture and interfacing of different peripheral devices with 8085 Microprocessor.</li> </ol>
23.	19PHP305A	Nanostructures and Characterization	<p>At the end of the course, Students will understand and:</p> <ol style="list-style-type: none"> <li>1. Explain the fundamental principles of nanotechnology and their application to biomedical engineering.</li> <li>2. Apply engineering and physics concepts to the nano-scale and non-continuum domain.</li> <li>3. Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature.</li> <li>4. Design processing conditions to engineer functional nanomaterials.</li> <li>5. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.</li> <li>6. Get motivated to select the deposition techniques for various applications</li> </ol>
24.	19PHP305B	Solar Energy and Its Utilization	<p>At the end of the course, Students will / can be able to</p> <ol style="list-style-type: none"> <li>1. Impart the knowledge of Storage technologies form the autonomous renewable energy sources.</li> <li>2. Explain the principles that underlie the ability of various natural phenomena to deliver solar energy.</li> <li>3. Discuss the positive and negative aspects of solar energy in relation to natural and human aspects of the environment.</li> <li>4. Understand the basic principles in wind energy conversion and advantage and disadvantage of wind energy conversion systems.</li> <li>5. Gain the knowledge about the energy produced from biomass and biogas.</li> <li>6. Understand the concepts of solar cell and solar energy</li> </ol>
25.	19PHP305C	Optoelectronics	<p>At the end of the course, Students will / can be able to</p> <ol style="list-style-type: none"> <li>1. Conversant with the application of optical properties and processes in semiconductor optical sources.</li> <li>2. Understand the operation of LEDs and lasers.</li> <li>3. Be familiar with the structures and performance of LEDs and lasers.</li> <li>4. Apply the knowledge of laser in holography</li> <li>5. Gain the knowledge in Fourier optics and Fourier transforming properties of lenses</li> <li>6. Understand the concepts of nonlinear optics and harmonic generations.</li> </ol>

26.	19PHP311	Advanced Physics Practical	At the end of the course, Students will / can be able to <ol style="list-style-type: none"> <li>1. Design and efficiently handle various instruments.</li> <li>2. Verify laws studied in the different theory course.</li> <li>3. Measure different properties of materials.</li> <li>4. Gain the knowledge in quantization of electromagnetic fields.</li> <li>5. Analyze the characteristics of oscillators and wave shaping circuits</li> <li>6. Understand the basic concepts of amplifiers and operational amplifiers</li> </ol>
27.	19PHP312	Advanced Electronics Practical	On completion of this lab course the students will be able to: <ol style="list-style-type: none"> <li>1. Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.</li> <li>2. Work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters;</li> <li>3. Troubleshoot interactions between software and hardware;</li> <li>4. Analyze abstract problems and apply a combination of hardware and software to address the problem</li> <li>5. Practically study the working of different electronic components circuits.</li> <li>6. Learn to minimize contributing variables and recognize the limitations of the equipment.</li> <li>7. Design and construction of circuits using analog component and trouble shooting of the circuits.</li> </ol>
28.	19PHP491	Project	Students can / will able to <ol style="list-style-type: none"> <li>1. Demonstrate a depth of knowledge of Physics.</li> <li>2. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.</li> <li>3. Demonstrate knowledge of contemporary issues in their chosen field of research.</li> <li>4. Demonstrate an ability to present and defend their research work.</li> <li>5. Demonstrate an ability to succeed in problem solving in electronics</li> <li>6. Think their own way of career</li> </ol>

## FACULTY OF ENGINEERING

Name of the Department: **Automobile Engineering**

**Course:** B.E.

Sl. No.	Course Code	Name of the Course	Course Outcomes
1	18BEAE301	Mathematics - III (PDE, Probability and Statistics)	<ol style="list-style-type: none"><li>1. Apply the fundamental concepts of partial differential equations and the various solution procedures for solving the first order non-linear partial differential equations.</li><li>2. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.</li><li>3. Apply the basic concepts of probability and standard distribution.</li><li>4. Analyze the basic concepts of one and two-dimensional random variables and apply in engineering applications.</li><li>5. Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.</li><li>6. Summarize the concept of testing of hypothesis for small and large samples in real-life problems.</li></ol>
2	18BEAE302	Engineering Mechanics	<ol style="list-style-type: none"><li>1. Determine the resultant force and moment for a given system of forces.</li><li>2. Analyse the plane trusses having different types of supports and determine the forces in each member.</li><li>3. Identify the location of centroid, centre of gravity and calculate the moment of inertia for different sections.</li><li>4. Apply the equations of motion of particles to calculate displacement, velocity and acceleration.</li><li>5. calculate dynamic forces exerted in rigid body</li><li>6. Determine the friction and its effects by using the laws of friction.</li></ol>
3	18BEAE303	Applied Thermodynamics	<ol style="list-style-type: none"><li>1. Apply the first law of thermodynamics to closed and open systems.</li><li>2. Solve the problems related to cycles and cyclic devices using the second law of thermodynamics.</li><li>3. Determine the thermodynamic properties of pure substances and its phase change processes.</li><li>4. Evaluate the air standard performance of heat engines.</li><li>5. Solve the psychrometric problems in various applications.</li><li>6. Calculate the performance of air compressors and refrigeration systems.</li></ol>

4	18BEAE304	Automotive Engines	<ol style="list-style-type: none"> <li>1. Differentiate the construction and operation of two-stroke and four-stroke engines.</li> <li>2. Name and explain various components of the fuel feed system.</li> <li>3. Discuss the combustion process and combustion chambers.</li> <li>4. List and describe the different methods of supercharging and turbocharging.</li> <li>5. Explain the importance of cooling system.</li> <li>6. Explain the importance of lubrication system.</li> </ol>
5	18BEAE305	Engineering Metrology And Measurements	<ol style="list-style-type: none"> <li>1. Explain the basic concept of measurement and characteristics of measuring instruments.</li> <li>2. Practice the appropriate linear and angular dimensions using precision measuring instruments.</li> <li>3. Examine the major terminologies for the gear and screw thread measurement.</li> <li>4. Explain the suitable type of instrument used to measure the mechanical parameters.</li> <li>5. Apply the advanced techniques in metrology to calculate the geometric dimensions.</li> <li>6. Practice the digital devices and computer aided inspection devices.</li> </ol>
6	18BEAE306	Biology For Engineers	<ol style="list-style-type: none"> <li>1. Summarise the cell structures and their functions.</li> <li>2. Explain the biomolecules functions.</li> <li>3. Classify the communicable and non-communicable human diseases.</li> <li>4. Illustrate the different organ function tests.</li> <li>5. Tell the applications of biology in environmental applications.</li> <li>6. Describe the concept of biomechanics.</li> </ol>
7	18BEAE311	Automotive Engine Components And Measurements Laboratory	<ol style="list-style-type: none"> <li>1. Identify and assemble the components of an engine.</li> <li>2. Explain the function of various components of an engine.</li> <li>3. Practice the appropriate linear and angular dimensions using precision measuring instruments.</li> <li>4. Examine the major terminologies for the gear and screw thread.</li> <li>5. Explain the suitable type of instrument used to measure the mechanical parameters.</li> <li>6. Understand the calibration of Vernier / micrometer / dial gauge.</li> </ol>
8	18BEAE312	Computer Aided Machine Drawing Laboratory	<ol style="list-style-type: none"> <li>1. Sketch the detailed drawing of sleeve and cotter joint.</li> <li>2. Sketch the detailed drawing of knuckle joint</li> <li>3. Sketch the detailed drawing of gib and cotter joint.</li> <li>4. Sketch the detailed drawing of universal coupling.</li> <li>5. Sketch the detailed drawing of screw jack.</li> <li>6. Create the assembly drawing of piston and connecting rod.</li> </ol>

9	18BEAE313	Thermal Engineering Laboratory	<ol style="list-style-type: none"> <li>1. Measure the flash point, fire point and viscosity of given sample.</li> <li>2. Draw the port timing diagram of two-stroke and valve timing diagram of four-stroke internal combustion engines.</li> <li>3. Evaluate the performance of internal combustion engine and reciprocating air compressor.</li> <li>4. Calculate the coefficient of performance of a refrigeration system.</li> <li>5. Estimate the thermal conductivity of material, heat transfer from surface and emissivity of a grey surface.</li> <li>6. Calculate the effectiveness of a heat exchanger.</li> </ol>
10	18BEAE351	Soft Skills	<ol style="list-style-type: none"> <li>1. Demonstrate the adequate soft skills required for the workplace.</li> <li>2. Express the presentation skills</li> <li>3. Express the views in group discussions with confidence.</li> <li>4. Demonstrate the appropriate interview skills.</li> <li>5. Manage time effectively.</li> <li>6. Explain the stress management.</li> </ol>
11	18BEAE401	Fluid Mechanics And Heat Transfer	<ol style="list-style-type: none"> <li>1. Estimate the flow properties and pressure head using fundamental laws of fluid mechanics.</li> <li>2. Evaluate the discharge and loss of energy in flow through pipes.</li> <li>3. Analyse the performance of hydraulic pumps and turbines for a given application.</li> <li>4. Apply the heat conduction equation to compute the rate of heat transfer in simple and composite systems.</li> <li>5. Determine the rate of heat transfer in convection mode.</li> <li>6. Determine the rate of heat transfer in radiation mode.</li> </ol>
12	18BEAE402	Strength Of Materials	<ol style="list-style-type: none"> <li>1. Evaluate the stresses and strains in simple and composite structures subjected to axial loads.</li> <li>2. Examine the shear force, bending moment and shear stress of various beams under different loading conditions.</li> <li>3. Examine the stresses induced in the shaft and closed coil helical springs subjected to torsion.</li> <li>4. Evaluate the slope and deflection of beams and buckling loads of columns with different boundary conditions.</li> <li>5. Examine the stresses in two-dimensional systems and thin cylinders.</li> <li>6. Familiar with construction of Mohr's circle.</li> </ol>
13	18BEAE403	Theory Of Machines	<ol style="list-style-type: none"> <li>1. Identify the simple mechanisms based on a given application, and find velocity and acceleration of simple mechanisms.</li> <li>2. Estimate the amount of power transmitted by drive.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Calculate the speed ratio of various types of the gear train and construct the cam profile for the various types of follower motion.</li> <li>4. Estimate the balancing mass for rotating and reciprocating masses by using the force and couple polygon.</li> <li>5. Evaluate the natural frequency of a single degrees of freedom system subjected to free and forced vibrations.</li> <li>6. Compute the torsional vibration of shaft.</li> </ol>
14	18BEAE404	Engineering Materials And Metallurgy	<ol style="list-style-type: none"> <li>1. Explain the phase diagrams of different engineering materials.</li> <li>2. Recognise the properties and applications of various metals and alloys.</li> <li>3. Identify the appropriate heat treatment processes for the given applications.</li> <li>4. Test the mechanical properties of the given materials for real-time applications.</li> <li>5. Understand the fundamentals of composites</li> <li>6. Identify the appropriate composites for applications in the automotive industry.</li> </ol>
15	18BEAE441	Automotive Chassis And Transmission	<ol style="list-style-type: none"> <li>1. Discuss the types of frame, front axle and steering system.</li> <li>2. Sketch and explain the different types of clutches and gearboxes.</li> <li>3. Describe the components in driveline, final drive and rear axle.</li> <li>4. Describe the suspension systems and wheels.</li> <li>5. Familiar with tyres – tyre construction – tyre designation</li> <li>6. Explain the construction and working principle of different types of brakes.</li> </ol>
16	18BEAE442	Automotive Electrical And Electronics Systems	<ol style="list-style-type: none"> <li>1. Sketch and explain the working principle of battery and ignition system.</li> <li>2. Discuss working of the starting system and charging system.</li> <li>3. Illustrate the automobile wiring system.</li> <li>4. Illustrate the automobile lighting system.</li> <li>5. Identify the sensors and actuators used in the automobile.</li> <li>6. Explain the electronic engine management system.</li> </ol>
17	18BEAE411	Fluid Mechanics And Strength Of Materials Laboratory	<ol style="list-style-type: none"> <li>1. Calculate the rate of fluid flow and coefficient of discharge in fluid flow devices.</li> <li>2. Measure the losses associated in a pipe flow.</li> <li>3. Evaluate the performance of non-positive and positive displacement pumps.</li> <li>4. Measure the tensile and shear strength of materials.</li> <li>5. Evaluate the hardness and impact strength of materials.</li> <li>6. Evaluate the compression strength of helical springs.</li> </ol>
18	18BEAE451	Course Oriented Project - I	<ol style="list-style-type: none"> <li>1. Identify a problem and develop the solutions.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Identify, formulate and analyse problems and justify solutions using scientific knowledge.</li> <li>3. Apply technical ideas, strategies and methodologies.</li> <li>4. Design and conduct experiments, as well as analyse and interpret data.</li> <li>5. Familiar with cost-effectiveness analysis.</li> <li>6. Prepare technical report and oral presentations.</li> </ol>
19	18BEAE452	Fuels And Lubricants	<ol style="list-style-type: none"> <li>1. Explain the manufacturing process of fuels and lubricants.</li> <li>2. Describe the refining process</li> <li>3. Define the various terminologies associated with fuel.</li> <li>4. Explain the manufacture of automotive lubricants</li> <li>5. Explain the thermo-chemistry of fuels.</li> <li>6. Select the suitable lubrication type for a particular application.</li> </ol>
20	17BEAE501	Design Of Machine Elements	<ol style="list-style-type: none"> <li>1. Design machine elements subjected to simple loads.</li> <li>2. Design shaft for various engineering applications.</li> <li>3. Design couplings for various engineering applications.</li> <li>4. Design bolted and welded joints subjected to static and eccentric loading conditions.</li> <li>5. Design helical spring and flywheel for various engineering applications.</li> <li>6. Design and select journal bearings and rolling contact bearings for various machines.</li> </ol>
21	17BEAE502	IC Engine Design	<ol style="list-style-type: none"> <li>1. Design cylinder and piston for the specified power and torque.</li> <li>2. Design connecting rod of an engine.</li> <li>3. Design crankshaft of an engine.</li> <li>4. Design valves and valve actuating components.</li> <li>5. Select suitable timing belt and pulley.</li> <li>6. Select suitable transmission chains and sprockets</li> </ol>
22	17BEAE503	Vehicle Dynamics	<ol style="list-style-type: none"> <li>1. Explain the basic elements of vibration of single degree of freedom system.</li> <li>2. Analyse the cornering and tractive property of a tyre.</li> <li>3. Understand the sources of vibration</li> <li>4. Design and analyse the suspension system of a vehicle.</li> <li>5. Analyse the gradeability, tractive force, braking force and stopping distance of a vehicle.</li> <li>6. Apply steady state cornering model to design the steering system of a vehicle.</li> </ol>
23	17BEAE504	Manufacturing Technology	<ol style="list-style-type: none"> <li>1. List and explain the steps involved in the casting process.</li> <li>2. Understand the theory of metal cutting</li> <li>3. Select the suitable type of machine for machining operations.</li> <li>4. Describe the types of grinding process.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Select the suitable material handling and storage system for flexible manufacturing systems.</li> <li>6. Select appropriate rapid prototyping process for engineering applications.</li> </ol>
24	17BEAE505A	Mechatronics	<ol style="list-style-type: none"> <li>1. Select the different types of sensor for various mechatronics applications.</li> <li>2. Identify suitable actuator used in a mechatronic system.</li> <li>3. Design a feedback controller for mechatronic systems.</li> <li>4. Develop a controller using microcontroller for the mechatronic system.</li> <li>5. Describe the PLC.</li> <li>6. Write a program for PLC used in the mechatronic systems.</li> </ol>
25	17BEAE5E04	Two And Three-Wheeler Technology	<ol style="list-style-type: none"> <li>1. Construct the frames of two and three wheelers of different layouts.</li> <li>2. Demonstrate the constructional details and principle of operation of various engine components.</li> <li>3. Identify and explain the types of transmission systems.</li> <li>4. Identify and explain the types of steering and suspension systems.</li> <li>5. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.</li> <li>6. Explain the servicing of two and three wheelers.</li> </ol>
26	17BEAE511	Thermal Engineering Laboratory	<ol style="list-style-type: none"> <li>1. Measure the flash point, fire point and viscosity of given sample.</li> <li>2. Draw the port timing diagram of two-stroke and valve timing diagram of four-stroke internal combustion engines.</li> <li>3. Evaluate the performance of internal combustion engine and reciprocating air compressor.</li> <li>4. Calculate the coefficient of performance of a refrigeration system.</li> <li>5. Estimate the thermal conductivity of material, heat transfer from surface and emissivity of a grey surface.</li> <li>6. Calculate the effectiveness of a heat exchanger.</li> </ol>
27	17BEAE512	Dynamics And mechatronics Laboratory	<ol style="list-style-type: none"> <li>1. Select the suitable governor for various engineering applications.</li> <li>2. Familiar with gyroscopic law and determine the gyroscopic couple</li> <li>3. Estimate the balancing mass for rotating and reciprocating masses.</li> <li>4. Calculate the natural frequency of transverse and torsional vibration.</li> <li>5. Select the different types of sensor for various mechatronics applications.</li> <li>6. Develop a controller using the microcontroller for mechatronic system.</li> </ol>

28	17BEAE513	Course Oriented Project – III	<ol style="list-style-type: none"> <li>1. Identify a problem and develop the solutions.</li> <li>2. Identify, formulate and analyse problems and justify solutions using scientific knowledge.</li> <li>3. Apply technical ideas, strategies and methodologies.</li> <li>4. Design and conduct experiments, as well as analyse and interpret data.</li> <li>5. Familiar with cost-effectiveness analysis.</li> <li>6. Prepare technical report and oral presentations.</li> </ol>
29	17BEAE551	In-Plant Training	<ol style="list-style-type: none"> <li>1. Apply theoretical knowledge to practical work situations.</li> <li>2. Become updated with all the modern changes in technological world.</li> <li>3. Learn, practice and acquire the skills necessary</li> <li>4. Acquire knowledge through interaction with professionals</li> <li>5. Prepare report and presentation with effective visual aids.</li> <li>6. To deliver effective presentation with clarity.</li> </ol>
30	17BEAE552	Technical Presentation	<ol style="list-style-type: none"> <li>1. Refer and utilise various technical resources available from multiple fields.</li> <li>2. Demonstrate sound technical knowledge on a given topic.</li> <li>3. Learn, practice and acquire the skills necessary</li> <li>4. Use a structured presentation methodology to prepare presentation material and effective visual aids.</li> <li>5. Determine and develop personal presentation style.</li> <li>6. To deliver effective presentation with clarity.</li> </ol>
31	17BEAE601	Automotive Chassis Design	<ol style="list-style-type: none"> <li>1. Design the frame and springs for automotive.</li> <li>2. Analyse the loads, moments and stresses at different sections of front axle.</li> <li>3. Design a suitable clutch for various engineering applications.</li> <li>4. Design the gearbox for various engineering applications.</li> <li>5. Design the propeller shaft to transmit required torque.</li> <li>6. Design the rear axle shafts.</li> </ol>
32	17BEAE602	Industrial Engineering And Operations Research	<ol style="list-style-type: none"> <li>1. Select suitable production planning methodologies, production system and plant layout for the industry.</li> <li>2. Execute an effective work study and ergonomics for better productivity.</li> <li>3. Formulate and select a suitable method to solve the linear programming problem.</li> <li>4. Solve different transportation and assignment-based models.</li> <li>5. Solve the inventory decision-making problem using mathematical modelling.</li> <li>6. Describe the economic order quantity.</li> </ol>
33	17BEAE603	Vehicle Body Engineering And Safety	<ol style="list-style-type: none"> <li>1. Distinguish the various aerodynamic forces and moments.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Explain different aspects of the car body, bus body and commercial vehicle.</li> <li>3. Describe the safety aspect of bus body</li> <li>4. Describe the commercial vehicle bodies</li> <li>5. Explain the regulations.</li> <li>6. Describe the material used in bodybuilding, tools used and body repairs.</li> </ol>
34	17BEAE604	Production Process For Automotive Components	<ol style="list-style-type: none"> <li>1. Select the materials for the components based on its functionality.</li> <li>2. Analyse suitable process for the manufacturing automotive components.</li> <li>3. List the casted and forged engine components.</li> <li>4. Select suitable surface coating technologies for the components.</li> <li>5. Describe the emission control system.</li> <li>6. Explain the stretch forming of auto body panels.</li> </ol>
35	17BEAE6E06	Quality Control And Reliability Engineering	<ol style="list-style-type: none"> <li>1. Summarise the concept of quality and process control for variables.</li> <li>2. Apply the process control for attributes.</li> <li>3. Explain the importance of sampling methods and their characteristics.</li> <li>4. Explain the concept of life testing.</li> <li>5. Evaluate the reliability concept with their models.</li> <li>6. Explain the product life cycles.</li> </ol>
36	17BEAE611	Automobile Vehicle Maintenance And Re-Conditioning Laboratory	<ol style="list-style-type: none"> <li>1. List the procedure for servicing of an automobile.</li> <li>2. Demonstrate the tuning of gasoline engines.</li> <li>3. Demonstrate the tuning of diesel engines.</li> <li>4. Identify the fault in electrical and electronic ignition systems.</li> <li>5. Analyse and troubleshoot the faults of fuel feed system, charging system, starting system and lighting system.</li> <li>6. Demonstrate the adjustment of the headlight beam.</li> </ol>
37	17BEAE612	Manufacturing Processes Laboratory	<ol style="list-style-type: none"> <li>1. Perform various operations on of lathe machine.</li> <li>2. Prepare a flat and contour surface using milling machine.</li> <li>3. Prepare holes with higher finish by Drilling / Tapping / Reaming.</li> <li>4. Perform surface and cylindrical grinding operations for surface finish.</li> <li>5. Prepare Surface preparation and etching techniques, heat treatment and metallographic studies.</li> <li>6. Perform various Forging processes.</li> </ol>
38	17BEAE613	Mini Project	<ol style="list-style-type: none"> <li>1. Demonstrate sound technical knowledge of a selected project topic.</li> <li>2. Apply the knowledge of mathematics, science and engineering to solve complex engineering problems.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Identify, formulate and analyse problems and justify solutions using scientific knowledge.</li> <li>4. Design and conduct experiments</li> <li>5. Analyse and interpret data.</li> <li>6. Prepare technical report and oral presentations.</li> </ol>
39	17BEAE651	Engine And Vehicle Management Systems	<ol style="list-style-type: none"> <li>1. Sketch the layout and explain the working of engine management systems.</li> <li>2. Explain the Microprocessor architecture</li> <li>3. Describe the working of the fuel system components</li> <li>4. Discuss the working of various vehicle management systems.</li> <li>5. Explain the vehicle security systems.</li> <li>6. Discuss the working of various vehicle management systems.</li> </ol>
40	16BECC701	Professional Ethics & Principles Of Management And Entrepreneurship Development	<ol style="list-style-type: none"> <li>1. Explain the human values.</li> <li>2. Implement the importance of ethics and professionalism.</li> <li>3. Practice the process of management's four functions.</li> <li>4. Understand the stress management</li> <li>5. Understand the budgetary and non-budgetary control technique</li> <li>6. Understand the entrepreneurial characteristics.</li> </ol>
41	16BEAE702	Finite Element Analysis	<ol style="list-style-type: none"> <li>1. Apply the numerical methods to formulate the simple finite element problems.</li> <li>2. Apply the one-dimensional finite element method to solve bar, beam and truss type problems.</li> <li>3. Apply the finite element method for plane stress, plane strain and axisymmetric conditions.</li> <li>4. Determine the temperature distribution of one and two dimensional heat transfer problems using one and two dimensional finite elements.</li> <li>5. Apply the numerical methods to formulate the higher order and isoperimetric problems.</li> <li>6. Apply Gaussian quadrature method.</li> </ol>
42	16BEAE7E04	Process Planning And Cost Estimation	<ol style="list-style-type: none"> <li>1. Explain the concepts of process planning and cost estimation.</li> <li>2. Assess the importance of cost estimation process and its procedures.</li> <li>3. Compute direct, indirect and overhead expenses.</li> <li>4. Determine the production cost of forging, welding, and foundry.</li> <li>5. Calculate the machining time for lathe, drilling, boring and shaping operations.</li> <li>6. Calculate the machining time for milling and grinding operations.</li> </ol>
43	16BTAROE01	Non Destructive Testing	<ol style="list-style-type: none"> <li>1. Select appropriate surface inspection techniques for the components to be inspected.</li> <li>2. Explain the magnetic particle testing method for ferrous materials.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Select and explain the suitable testing method for testing internal defects.</li> <li>4. Apply radiography testing methods for different suitable applications.</li> <li>5. Understand the acoustic emission testing principle</li> <li>6. Choose a suitable special non-destructive technique for various applications.</li> </ol>
44	16BESH0E07	Applied Electrochemistry	<ol style="list-style-type: none"> <li>1. Outline the basic principles of chemistry in electrochemical material.</li> <li>2. Examine the properties of conducting polymers.</li> <li>3. Apply the concepts of electrochemistry in storage devices.</li> <li>4. Identify the concepts of storage devices and their applications.</li> <li>5. Apply suitable materials for the manufacturing of storage devices.</li> <li>6. Integrate the chemical principles in the projects undertaken in the field of engineering and technology.</li> </ol>
45	16BEAE711	Auto Scanning And Vehicle Testing Laboratory	<ol style="list-style-type: none"> <li>1. Analysis of engine using Computerized engine analyzer.</li> <li>2. Perform wheel balancing.</li> <li>3. Perform wheel alignment.</li> <li>4. Understand Head light focusing test</li> <li>5. Perform emission test.</li> <li>6. Perform Braking distance test and Visibility test</li> </ol>
46	16BEAE712	Computer Aided Design Analysis Laboratory	<ol style="list-style-type: none"> <li>1. Analysis of piston and connecting rod using FEA software.</li> <li>2. Analysis of bumper using FEA software.</li> <li>3. Analysis of leaf spring using FEA software.</li> <li>4. Analysis of composite structure using FEA software</li> <li>5. Find the temperature distribution for heat conduction using FEA software.</li> <li>6. Dynamic analysis of the simple structure using FEA software.</li> </ol>
47	16BEAE791	Project Work Phase - I	<ol style="list-style-type: none"> <li>1. Demonstrate a sound technical knowledge of their selected project topic.</li> <li>2. Apply the knowledge of mathematics, science and engineering to solve complex engineering problems.</li> <li>3. Identify, formulate and analyse problems and justify solutions using scientific knowledge.</li> <li>4. Design and conduct experiments, as well as analyse and interpret data.</li> <li>5. Familiar with cost-effectiveness analysis.</li> <li>6. Prepare technical report and oral presentations.</li> </ol>
48	16BEAE801	Total Quality Management	<ol style="list-style-type: none"> <li>1. Use the concepts, dimension of quality and philosophies of TQM.</li> <li>2. Apply the principles of TQM and its strategies in industries.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Apply the statistical quality tools and seven management tools.</li> <li>4. Choose suitable TQM tools for continuous improvement.</li> <li>5. Understand the Failure Modes and Effects Analysis.</li> <li>6. Use the concepts of quality management system in industries.</li> </ol>
49	16BEAE8E03	Off Road Vehicles	<ol style="list-style-type: none"> <li>1. Explain the construction layout and features of off-road vehicles.</li> <li>2. Select earth moving constructional machine for a particular application.</li> <li>3. Describe the construction details and working of industrial vehicles.</li> <li>4. State the special features of tractor attachments and military vehicles.</li> <li>5. Illustrate the mechanism of brake.</li> <li>6. Illustrate the mechanism of suspension and steering.</li> </ol>
50	16BEAE891	Project Work Phase-II And Viva- Voce	<ol style="list-style-type: none"> <li>1. Demonstrate sound technical knowledge of the project topic.</li> <li>2. Apply the knowledge of mathematics, science and engineering to solve complex engineering problems.</li> <li>3. Identify, formulate and analyse problems and justify solutions using scientific knowledge.</li> <li>4. Design and conduct experiments, as well as analyse and interpret data.</li> <li>5. Execute the project based on the design developed during phase - I.</li> <li>6. Prepare technical report and oral presentations.</li> </ol>

Name of the Department: **Biotechnology**

**Course:** B.Tech. Biotechnology

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BTBT101	Mathematics-I	<ol style="list-style-type: none"><li>1. To understand of the ideas of limits and continuity and ability to calculate with them and apply them.</li><li>2. To apply various techniques in solving Partial Differential Equations</li><li>3. To Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.</li><li>4. To apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.</li><li>5. To understand the ideas of differential equations and facility in solving simple standard examples.</li><li>6. To improve facilities in algebraic manipulation.</li></ol>
2.	19BTBT141	Chemistry-I	<ol style="list-style-type: none"><li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li><li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li><li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li><li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li><li>5. List major chemical reactions that are used in the synthesis of molecules.</li><li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li></ol>
3.	19BTBT142	Basic Electrical Engineering	<ol style="list-style-type: none"><li>1. To understand and analyse basic electric and magnetic circuits.</li><li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li><li>3. Attributing the electrical machines and transformer.</li><li>4. Evaluate the various digital circuits in real time applications.</li><li>5. Analysis various semiconductor devices in real time applications.</li><li>6. Reproduce the Measuring Instruments and Electrical Installation.</li></ol>
4.	19BTBT111	Engineering Graphics & Design	<ol style="list-style-type: none"><li>1. Introduction to engineering design and its place in society</li><li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li><li>3. Infer various aspects of projections in all planes.</li><li>4. Interpret the projection aspects of solids with changing positions.</li><li>5. Exposure to solid modelling, computer-aided geometric design, creating working drawings and</li></ol>

			<p>engineering communication</p> <p>6. Understand the basics to use various techniques in graphics and design.</p>
5.	19BTBT201	Mathematics – II	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. To apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.</li> <li>6. In applying the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in their respective fields.</li> </ol>
6.	19BTBT202	English	<ol style="list-style-type: none"> <li>1. Use English language for communication: verbal &amp; non-verbal.</li> <li>2. Enrich comprehension and acquisition of speaking &amp; writing ability.</li> <li>3. Gain confidence in using English language in real life situations.</li> <li>4. Improve word power: lexical, grammatical and communication competence.</li> <li>5. To guide the students to write business letters and other forms of technical writing.</li> <li>6. To enable students to prepare for oral communication in formal contexts.</li> </ol>
7.	19BTBT241	Engineering Physics	<ol style="list-style-type: none"> <li>1. Identify the elastic nature of materials.</li> <li>2. Infer the characteristics of laser for various engineering applications.</li> <li>3. Extend the knowledge on optical fibre for communication purposes.</li> <li>4. Illustrate the thermal properties of materials through various methods.</li> <li>5. Develop the idea of quantum mechanics through applications.</li> <li>6. Identify the different atomic arrangements of</li> </ol>

			crystals and its defects.
8.	19BTBT242	Programming for Problem Solving	<ol style="list-style-type: none"> <li>1. To formulate simple algorithms for arithmetic and logical problems</li> <li>2. To translate the algorithms to programs (in C language)</li> <li>3. To test and execute the programs and correct syntax and logical errors</li> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs.</li> </ol>
9.	19BTBT243	Biochemistry I	<ol style="list-style-type: none"> <li>1. Outline the cellular foundations of Biochemistry</li> <li>2. Interpret different types of biomolecules and its interaction with water.</li> <li>3. Analyze the function and properties of carbohydrates.</li> <li>4. Explain the importance of amino acids, Peptides, Proteins and lipids.</li> <li>5. Examine the structure, function and properties of nucleotides, nucleic acid, DNA.</li> <li>6. Assess various functions and properties of important biomolecule.</li> </ol>
10.	18BTBT301	Transforms and partial differential equation	<ol style="list-style-type: none"> <li>1. Understand how to solve the given standard partial differential equations.</li> <li>2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.</li> <li>3. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.</li> <li>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.</li> <li>5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.</li> <li>6. The learners can equip themselves in the transform techniques and solve partial differential equations</li> </ol>
11.	18BTBT302	Cell Biology	<ol style="list-style-type: none"> <li>1. Summarize the structure and function of cell components</li> <li>2. Understand the role of the cytoskeletal proteins and link it with cell cycle.</li> <li>3. Illustrate the transport process across the cell membrane.</li> <li>4. Outline the basic ideas on signalling process through the receptors.</li> <li>5. Explain the electron transfer in mitochondria.</li> <li>6. Relate the importance of cell signalling process to understand diseases.</li> </ol>
12.	18BTBT303	Microbiology	<ol style="list-style-type: none"> <li>1. Outline the history of microbiology and microbial</li> </ol>

			<p>staining techniques.</p> <ol style="list-style-type: none"> <li>2. Discuss the microbial structural organization and multiplication.</li> <li>3. Infer the basic requirements for microbial growth towards the biosynthesis of important molecules.</li> <li>4. Discuss the controlling mechanism of microorganisms.</li> <li>5. Illustrate the production of various metabolites and its applications.</li> <li>6. Explain the role of microorganisms in bioremediation.</li> </ol>
13.	18BTBT304	Principles of Chemical Engineering	<ol style="list-style-type: none"> <li>1. Outline the basic chemical calculations and the basic laws governing it.</li> <li>2. Illustrate basic laws of thermodynamics.</li> <li>3. Infer the overall material balances of chemical reactions and its basic calculations.</li> <li>4. Outline the application of fluid flow mechanics in chemical engineering.</li> <li>5. Discuss the fluid flow and its measurements.</li> <li>6. Understand the basic principles of chemical calculations and measurements.</li> </ol>
14.	18BTBT305	Instrumental Methods of analysis	<ol style="list-style-type: none"> <li>1. Infer the various sources and properties of electromagnetic radiation.</li> <li>2. Discuss the theory of molecular absorption spectroscopy.</li> <li>3. Relate the theory, instrumentation and applications of various molecular spectroscopies.</li> <li>4. Interpret the theory and instrumentation of magnetic resonance and mass spectroscopy.</li> <li>5. Identify the various chromatographic and electrophoresis techniques for purification.</li> <li>6. Explain the instrumentation and applications of different thermal analysis techniques.</li> </ol>
15.	18BTBT311	Cell Biology and Microbiology Lab	<ol style="list-style-type: none"> <li>1. Illustrate the handling of microscope and categorize the cells present in the biological sample.</li> <li>2. Interpret the various staining techniques to identify the cell.</li> <li>3. Outline the stages of mitosis.</li> <li>4. Understand the growth of the organism and the parameters that influences their stability to grow.</li> <li>5. Understand the knowledge about the chemicals that controls the bacterial growth.</li> <li>6. Recall the growth curve and the control of microorganisms.</li> </ol>
16.	18BTBT351	Constitution of India	<ol style="list-style-type: none"> <li>1. Describe the functions of the Indian government.</li> <li>2. Tell about the rules of the Indian constitution.</li> <li>3. Understand and appreciate different culture among the people.</li> <li>4. Explain the structure and its respective functions of central government</li> <li>5. Outline the basic features of state government and its structure</li> <li>6. Analyze the different forms of Indian citizen sectors in the society</li> </ol>

17.	18BTBT352	Synthesis of Organic molecules	<ol style="list-style-type: none"> <li>1. Experiment the synthesis techniques of aspirin</li> <li>2. Perform the synthesis methods of p-nitroacetanilide</li> <li>3. Analyze the preparation process of Acetanilide from Aniline</li> <li>4. Perform the extraction of lycopene from given source</li> <li>5. Outline the techniques to prepare alpha D-glucopyranose pentaacetate, 1,2:5,6-dicyclohexylidene- alpha-D-glucofuranose</li> <li>6. Demonstrate the synthesis of organic molecules.</li> </ol>
18.	18BTBT401	Probability and Biostatistics	<ol style="list-style-type: none"> <li>1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.</li> <li>2. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.</li> <li>3. Apply the concept of testing of hypothesis for small and large samples in real life problems.</li> <li>4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.</li> <li>5. Have the notion of sampling distributions and statistical techniques used in engineering and management problems.</li> <li>6. To expose statistical methods designed to contribute to the process of making the judgements.</li> </ol>
19.	18BTBT402	Unit operations	<ol style="list-style-type: none"> <li>1. Interpret the properties of mixing and agitation in different flow systems.</li> <li>2. Outline the basic principle of filtration and its application in different filtration methods.</li> <li>3. Discuss the modes of heat transfer.</li> <li>4. Illustrate the mechanism of heat transfer through different dimensional surfaces.</li> <li>5. Infer the basics of convectional heat transfer in different surfaces.</li> <li>6. Appraise the basics of design, equipmentation and calculations of evaporators and heat exchangers.</li> </ol>
20.	18BTBT403	Chemical Thermodynamics	<ol style="list-style-type: none"> <li>1. Discuss the various properties of the fluids and its calculations.</li> <li>2. Explain the concept of solution thermodynamics and composition models.</li> <li>3. Analyze the criteria of phase equilibria for different component system.</li> <li>4. Apply the concept of chemical reaction equilibria and equilibrium conversion.</li> <li>5. Analyze the thermodynamic flow process.</li> <li>6. Illustrate the working principles and the process involved in the refrigeration and Liquefaction system.</li> </ol>
21.	18BTBT404	Basics of Industrial Biotechnology	<ol style="list-style-type: none"> <li>1. Outline the scope of biotechnology and its commercial potential.</li> <li>2. Interpret the modern biotechnological processing</li> </ol>

			<p>techniques for the production of commercial bioproducts.</p> <ol style="list-style-type: none"> <li>3. Illustrate the production methods of primary metabolites.</li> <li>4. Illustrate the production methods of secondary metabolites.</li> <li>5. Infer the knowledge on commercial enzyme and bioproduct production.</li> <li>6. Explain the production of various commercially available products using recombinant technology.</li> </ol>
22.	18BTBT405	Molecular Biology	<ol style="list-style-type: none"> <li>1. Discuss the concepts related to eukaryotic and prokaryotic genetics.</li> <li>2. Identify the structure of nucleic acids, DNA replication and chromosome organization.</li> <li>3. Illustrate the prokaryotic and eukaryotic transcription, and its post transcriptional modifications.</li> <li>4. Outline the concept of genetic code, translation process and post translational modifications.</li> <li>5. Interpret the process of regulation of gene expression and its importance.</li> <li>6. Identify the different types of mutation and DNA repair mechanisms.</li> </ol>
23.	18BTBT406	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
24.	18BTBT411	Chemical Engineering Lab	<ol style="list-style-type: none"> <li>1. Outline the chemical engineering principles and operations.</li> <li>2. Calculate the flow measurements and pressure drop in pipes and different reactors.</li> <li>3. Analyze the process of filtration and heat transfer.</li> <li>4. Perform the distillation and extraction.</li> <li>5. Demonstrate the process involved in adsorption equilibrium.</li> <li>6. Demonstrate the process involved in leaching.</li> </ol>
25.	18BTBT451	Production of commercially valuable	<ol style="list-style-type: none"> <li>1. Understand the ethanol production strategies and methods from molasses and grapes</li> <li>2. Experiment the production of biofertilizers from</li> </ol>

		bioproducts	<p>various sources</p> <ol style="list-style-type: none"> <li>3. Demonstrate the uses and preparation methods of single cell protein</li> <li>4. Outline the factors to be considered in mushroom cultivation</li> <li>5. Perform the production of jam using various composition of mixed fruits</li> <li>6. Tell about the production strategies of industrially important bioproducts using natural sources</li> </ol>
26.	17BTBT501	Bioprocess Engineering	<ol style="list-style-type: none"> <li>1. Understand the fermentation processes.</li> <li>2. Interpret the design of bioreactors</li> <li>3. Describe the scale up of bioreactors.</li> <li>4. Infer the different types of bioprocess simulation and modelling</li> <li>5. Examine the immobilized enzyme kinetics and its significance.</li> <li>6. Outline the commercial production of bioproducts.</li> </ol>
27.	17BTBT502	Genetic Engineering	<ol style="list-style-type: none"> <li>1. Discuss the knowledge on the basics of rDNA technology.</li> <li>2. Outline the usage of recombinant molecules in research and development.</li> <li>3. Understand gene libraries construction and to perform blottings.</li> <li>4. Interpret the in-depth knowledge acquired to perform PCR reactions and their types.</li> <li>5. Infer the importance of DNA sequencing methods.</li> <li>6. Summarize the concept of rDNA technology and its importance in cloning, gene therapy and relate its applications.</li> </ol>
28.	17BTBT503	Basics of Industrial Biotechnology	<ol style="list-style-type: none"> <li>1. Outline the scope of biotechnology and its commercial potential.</li> <li>2. Interpret the modern biotechnological processing techniques for the production of commercial bioproducts.</li> <li>3. Illustrate the production methods of primary metabolites.</li> <li>4. Illustrate the production methods of secondary metabolites.</li> <li>5. Infer the knowledge on commercial enzyme and bioproduct production.</li> <li>6. Explain the production of various commercially available products using recombinant technology.</li> </ol>
29.	17BTBT504A	Bioinformatics	<ol style="list-style-type: none"> <li>1. Outline the scope of biotechnology and its commercial potential.</li> <li>2. Interpret the modern biotechnological processing techniques for the production of commercial bioproducts.</li> <li>3. Illustrate the production methods of primary metabolites.</li> <li>4. Illustrate the production methods of secondary metabolites.</li> <li>5. Infer the knowledge on commercial enzyme and bioproduct production.</li> <li>6. Explain the production of various commercially available products using recombinant technology.</li> </ol>

30.	17BTBT505B	Food Biotechnology	<ol style="list-style-type: none"> <li>1. Compare and contrast different food constituents and their effectiveness.</li> <li>2. Summarize the controlling measures for food spoilage.</li> <li>3. Prioritize diverse properties of fermented foods.</li> <li>4. Construct and design the food additives for food preservation.</li> <li>5. Apply the knowledge on basics of food processing and preservation methods.</li> <li>6. Examine and solve the problems related to food deterioration and its preventive measures.</li> </ol>
31.	17BTBT5E01	Animal Biotechnology	<ol style="list-style-type: none"> <li>1. Identify the different views on tissue culturing.</li> <li>2. Differentiate various breeding farm animals.</li> <li>3. Illustrate the concept behind transgenic animal technology.</li> <li>4. Evaluate the bacterial and viral diseases that attack animals.</li> <li>5. Analyze and categorize the best approach on recombinant cytokines.</li> <li>6. Discuss the diverse techniques on animal cell culturing and its mechanism.</li> </ol>
32.	17BTBT5E02	Entrepreneurship in Biotechnology	<ol style="list-style-type: none"> <li>1. Summarize the characteristics of different biotech industries.</li> <li>2. Evaluate the different lab construction through new ventures.</li> <li>3. List the various parameters of research and developmental techniques.</li> <li>4. Explain the opportunities to know different industrial strategic plans.</li> <li>5. Recognize basic concepts of IPR and ethics in biobased product production.</li> <li>6. Identify and list different techniques for entrepreneurship in biotechnology.</li> </ol>
33.	17BTBT511	Bioprocess Lab	<ol style="list-style-type: none"> <li>1. Evaluate the thermal death kinetics.</li> <li>2. Perform the batch sterilization batch cultivation.</li> <li>3. Identify and perform media optimization using Plackett Burman and RSM.</li> <li>4. Demonstrate the different <math>k_La</math> estimation methods.</li> <li>5. Perform the experiment on residence time distribution.</li> <li>6. Interpret enzyme kinetics and enzyme immobilization techniques.</li> </ol>
34.	17BTBT512	Molecular Biology and Genetic Engineering Lab	<ol style="list-style-type: none"> <li>1. Carry out agarose gel electrophoresis and isolation of DNA samples individually.</li> <li>2. Develop the knowledge of techniques involved in DNA isolation and purification.</li> <li>3. Perform the restriction enzyme digestion and ligation of DNA samples.</li> <li>4. Produce recombinant DNA and implement blue white screening techniques to screen them.</li> <li>5. Develop methods to produce recombinant proteins and understand their applications and perform SDS PAGE and PCR reactions.</li> <li>6. Summarize the overall structure of rDNA</li> </ol>

			technology and implement its techniques in research and development.
35.	17BTBT513A	Bioinformatics Lab	<ol style="list-style-type: none"> <li>1. Outline the techniques to retrieve sequences from different biological databases.</li> <li>2. Discuss the pattern matching by pairwise and multiple sequence alignment</li> <li>3. Construct phylogenetic tree by using distance based and character-based methods</li> <li>4. Predict and validate structural features of protein.</li> <li>5. Understand the primer designing steps for cloning.</li> <li>6. Perform basic bioinformatics research using online tools</li> </ol>
36.	17BTBT551	Separation of Bioactive Compounds from Plant Material	<ol style="list-style-type: none"> <li>1. Explain the isolation and extraction of natural bioactive compounds from various sources</li> <li>2. Outline the different chromatographic techniques for the separation of bioactive compounds from the mixture</li> <li>3. Determine the nature of compounds using analytical tools</li> <li>4. Perform the extraction of bioactive compounds from tea leaves</li> <li>5. Analyze and purify the caffeine from the tea leaf extract</li> <li>6. Experiment compound isolation from the natural source</li> </ol>
37.	17BTBT601	Mass Transfer Operations	<ol style="list-style-type: none"> <li>1. Discuss the molecular diffusions and mass transfer operation in different system.</li> <li>2. Outline the absorption principles and its concepts for gas liquid operations.</li> <li>3. Infer the basic concept of equilibria and distillation concepts in vapour liquid operations.</li> <li>4. Understand the HETP, HTU and NTU concepts.</li> <li>5. Interpret the equilibria of different systems in extraction and leaching operations.</li> <li>6. Outline the concepts of adsorption and drying in solid – fluid operations.</li> </ol>
38.	17BTBT602	Immunology	<ol style="list-style-type: none"> <li>1. Discuss the cells and components of immune system.</li> <li>2. Explain the basics of B, T cells, genes and generation of antibody and its functions.</li> <li>3. Infer the basic views on monoclonal antibodies and antigen- antibody interactions.</li> <li>4. Discuss the concept of immunity and various immunological responses to infections.</li> <li>5. Discuss the basics of Transplantation and tumor therapies.</li> <li>6. To illustrate the current trends in treatment of auto immune disease.</li> </ol>
39.	17BTBT603A	Biopharmaceutical technology	<ol style="list-style-type: none"> <li>1. Illustrate the different pharmaceutical parameters for the current and future biotechnology related products on the market.</li> <li>2. Outline the concepts of Pharmacokinetics.</li> <li>3. Infer the basic knowledge on drug process, manufacturing methods and its application.</li> <li>4. Discuss about the solid dosage forms of drug</li> </ol>

			<p>manufacturing.</p> <ol style="list-style-type: none"> <li>5. Explain the manufacturing process of liquid orals and topical.</li> <li>6. Interpret the legal steps involved in progressing a new drug to market.</li> </ol>
40.	17BTBT604B	Nanobiotechnology	<ol style="list-style-type: none"> <li>1. Summarize the characteristics different nanoparticles.</li> <li>2. Evaluate the different structural and functional principles of biotechnology.</li> <li>3. Explain the microfluidic devices.</li> <li>4. Discuss the protein and DNA based nanostructures.</li> <li>5. Recognize cancer curing nanoparticles.</li> <li>6. Identify and list different nanoparticles for different controlling measures.</li> </ol>
41.	17BTBT611	Immunology Lab	<ol style="list-style-type: none"> <li>1. Infer the basic handling techniques for animal studies.</li> <li>2. Outline the basics of isolation and identification of cells and blood group.</li> <li>3. Illustrate the Immuno electrophoresis and Immuno diffusion for determination of antibody.</li> <li>4. Understand the knowledge about ELISA and western blotting for identification of various diseases.</li> <li>5. Explain the identification of typhoid antigens by Widal test.</li> <li>6. Discuss principles of T-cell resetting.</li> </ol>
42.	17BTBT612A	Biopharmaceutical Technology Lab	<ol style="list-style-type: none"> <li>1. Demonstrate the procedure for tablet and granules preparation using wet and dry granulation methods</li> <li>2. Analyze the prepared formulation for quality control</li> <li>3. Experiment the synthesis of liquid oral syrups</li> <li>4. Perform the tropical preparation formulations using a standard method</li> <li>5. Interpret the quality and quantity of Riboflavin tablets using assays</li> <li>6. Analyze the dextrose injection using typical assays.</li> </ol>
43.	16BTCC701	Professional Ethics, Principles of Management and Entrepreneurship development.	<ol style="list-style-type: none"> <li>1. Explain the engineering ethics</li> <li>2. Outline the Moral and Social Values and Loyalty</li> <li>3. Justify the rights of other</li> <li>4. Illustrate the values of leadership skills</li> <li>5. Assess the skills of entrepreneur</li> <li>6. Discuss the management skills</li> </ol>
44.	16BTBT702	Downstream Processing	<ol style="list-style-type: none"> <li>1. Outline the principles involved in downstream processing and characteristics of biomolecules.</li> <li>2. Discuss the various cell disruption techniques for product release.</li> <li>3. Illustrate the different physical methods of separation of bioproducts.</li> <li>4. Relate and apply the methods available for the isolation of products.</li> <li>5. Discuss the techniques used for the product purification.</li> </ol>

			6. Outline the principles for the final product formulation and finishing operations.
45.	16BTBT7E02	Environmental Biotechnology	<ol style="list-style-type: none"> <li>1. Summarize the characteristics of soil microbes and its interactions.</li> <li>2. Evaluate the different xenobiotics present and methods to degrade them.</li> <li>3. Describe the industrial waste management systems.</li> <li>4. List the opportunities in waste treatment industries and its management.</li> <li>5. Recognize natural and engineered biotreatment methods to remediate pollutants.</li> <li>6. Identify and list different environmental issues and its remedy.</li> </ol>
46.	16BTBT7E04	Cancer biology	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of cancer biology</li> <li>2. Interpret the mechanism of carcinogenesis</li> <li>3. Outline the principles of molecular cell biology</li> <li>4. Understand the significance of cancer metastasis</li> <li>5. Summarize the different types of cancer therapy</li> <li>6. Recall the molecular tools of cancer diagnosis</li> </ol>
47.	16BTSHOE05	Solid Waste Management	<ol style="list-style-type: none"> <li>1. Outline the basic principles of Solid waste and separation of wastes(K)</li> <li>2. Identify the concepts of treatment of solid wastes (S)</li> <li>3. Identify the methods of wastes disposals. (S)</li> <li>4. Examine the level of Hazardousness and its management. (S)</li> <li>5. Examine the possible of the energy production using waste materials. (S)</li> <li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)</li> </ol>
48.	16BEEEOE04	Renewable Energy Resources	<ol style="list-style-type: none"> <li>1. Explain the Utilization and conservation of different types of renewable energy sources</li> <li>2. Summarize the production, estimation, application and storage of solar energy</li> <li>3. Describe the fundamentals of conversion, application, types and schemes of electricity generation using wind energy</li> <li>4. Outline the conversion of hydro energy from different types of sources for the utilization of electrical energy.</li> <li>5. Identify the other forms of energy sources like magnetic, thermal and biological sources for the electrical energy generation</li> <li>6. Infer the basics on electrical energy production and utilization from various forms of renewable energy sources</li> </ol>
49.	16BTBT711	Downstream Processing Lab	<ol style="list-style-type: none"> <li>1. Perform the various methods of precipitation for the protein purification.</li> <li>2. Practice and evaluate the extraction of various products from the given sample.</li> <li>3. Demonstrate the finishing operations such as crystallization and drying.</li> <li>4. Execute the process of centrifugation for cell</li> </ol>

			<p>fraction.</p> <ol style="list-style-type: none"> <li>5. Inspect the purification of driven sample through dialysis.</li> <li>6. Design and develop appropriate techniques for the purification of given enzyme.</li> </ol>
50.	16BTBT8E03	Stem cell technology	<ol style="list-style-type: none"> <li>1. Summarize the characteristics stem cells.</li> <li>2. Evaluate the different structural and functional parameters of invitro fertilization.</li> <li>3. List the properties of adult stem cells in differentiation.</li> <li>4. Explain the uses of stem cells in drug discovery and tissue engineering.</li> <li>5. Recognize various stem cell therapies.</li> <li>6. Identify and list different nanoparticles for different controlling measures.</li> </ol>
51.	16BTBT8E07	IPR and ethical issues in biotechnology	<ol style="list-style-type: none"> <li>1. Discuss the concept behind biosafety and protocol to follow the biosafety in formulating biological products</li> <li>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</li> <li>3. Outline the basics on IPR policies and its procedure to be followed during biological product production and commercialization</li> <li>4. Describe the applications of patents and copyrights for bioproducts</li> <li>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.</li> <li>6. Tell about the bioethics to be followed while handling genetic and recombinant technologies</li> </ol>
52.	16BTBT8E04	Biomass energy	<ol style="list-style-type: none"> <li>1. Compare and contrast energy use as renewable and non-renewable energy.</li> <li>2. Synthesize the biomass for renewable energy production.</li> <li>3. Prioritize diverse properties of fuels.</li> <li>4. Construct and design the bioenergy production through agricultural wastes.</li> <li>5. Apply the knowledge on downstream processing for bioenergy production.</li> <li>6. Examine and solve the problems related to bioenergy production.</li> </ol>

Name of the Department: **Biomedical Engineering**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BEBME101	Mathematics – I	<ol style="list-style-type: none"><li>1. Evaluate the limits and continuity of various functions.</li><li>2. Apply various techniques to solve Partial Differential Equations</li><li>3. Find an appropriate method to solve the given integral.</li><li>4. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.</li><li>5. Solve simple standard examples using the ideas of differential equations.</li><li>6. Apply the knowledge acquired to solve various engineering problems.</li></ol>
2.	19BEBME141	Chemistry - I	<ol style="list-style-type: none"><li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li><li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li><li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li><li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li><li>5. List major chemical reactions that are used in the synthesis of molecules.</li><li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li></ol>
3.	19BEBME142	Basic Electrical Engineering	At the end of this course, students will be able to <ol style="list-style-type: none"><li>1. Understand and analyse basic electric and magnetic circuits.</li><li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li><li>3. Attributing the electrical machines and transformer.</li><li>4. Evaluate the various circuits in real time applications.</li><li>5. Analysis various semiconductor devices in real time applications.</li><li>6. Reproduce the Measuring Instruments and Electrical Installation</li></ol>
4.	19BEBME143	Programming For Problem Solving	The course will enable the students <ol style="list-style-type: none"><li>1. To formulate simple algorithms for arithmetic and logical problems</li><li>2. To translate the algorithms to programs (in C language)</li><li>3. To test and execute the programs and correct syntax and logical errors</li></ol>

			<ol style="list-style-type: none"> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
5.	19BEBME201	Mathematics – II	<ol style="list-style-type: none"> <li>1. Apply advanced matrix knowledge to engineering problems.</li> <li>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.</li> <li>3. Find the Analytic functions using the Cauchy Riemann equations and discuss how geometric structures are changing under conformal mappings.</li> <li>4. Evaluate complex integrals using the Cauchy's integral formula and the Residue theorem.</li> <li>5. Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.</li> <li>6. Apply the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in Engineering fields.</li> </ol>
6.	19BEBME202	English	<p>Students undergoing this course will be able to</p> <ol style="list-style-type: none"> <li>1. Describe English language for communication: verbal &amp; non-verbal.</li> <li>2. Express comprehension and acquisition of speaking &amp; writing ability.</li> <li>3. Improve the student confidence in using English language in real life situations.</li> <li>4. Develop word power: lexical, grammatical and communication competence.</li> <li>5. To prepare the students to write business letters and other forms of technical writing.</li> <li>6. Demonstrate the students to prepare for oral communication in formal contexts.</li> </ol>
7.	19BEBME203	Introduction To Biomedical Engineering	<ol style="list-style-type: none"> <li>1. Ability to understand the concepts of medical devices and equipments.</li> <li>2. The student will learn about professional and ethical responsibility</li> <li>3. The student will learn about contemporary BME research</li> <li>4. Utilize different medical devices applied in measurement of parameters related to cardiology, neurology</li> </ol>

			<ol style="list-style-type: none"> <li>5. Identify the electrical hazards and Implement methods of patient safety</li> <li>6. List out the ethical values and issues</li> </ol>
8.	19BEBME241	Engineering Physics	<p>Upon completion of this course, the students will be able</p> <ol style="list-style-type: none"> <li>1. Develop knowledge on the basics of properties of matter and its applications.</li> <li>2. List the concepts of sound, ultrasonics and their applications.</li> <li>3. Analyze the concepts of thermal properties of materials and advanced physics concepts of quantum theory</li> <li>4. Develop knowledge on the basics of light, laser, fibre optics and their applications.</li> <li>5. Understand the basics of crystals and their structures.</li> <li>6. Apply the knowledge gained from this course to solve the relevant problems in engineering stream.</li> </ol>
9.	19BEBME242	Electronic Devices And Circuits	<ol style="list-style-type: none"> <li>1. Demonstrate the fundamental concepts of electronic devices</li> <li>2. Build an electronic circuits using transistors.</li> <li>3. Analyze any electronic circuits logically</li> <li>4. Understand the specifications of regulators and power supply circuits.</li> <li>5. Apply positive feedback principle and design oscillators.</li> <li>6. Design multivibrator circuits.</li> </ol>
10.	18BEBME301A	Optimization and Calculus of Variables	<ol style="list-style-type: none"> <li>1. Be able to solve problems in different environments and develop critical thinking</li> <li>2. Be able to build and solve Transportation Models</li> <li>3. Be able to analyse Assignment Models,</li> <li>4. Be able to solve integer programming and Nonlinear programming</li> <li>5. Be able to understand Hungarian Algorithm</li> <li>6. Analyse and apply branch bound method in engineering problems</li> </ol>
11.	18BEBME301B	Linear Algebra and partial differential equations	<ol style="list-style-type: none"> <li>1. Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.</li> <li>2. Demonstrate accurate and efficient use of advanced algebraic techniques.</li> <li>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.</li> <li>4. Able to solve various types of partial differential equations.</li> <li>5. Able to solve engineering problems using Fourier series.</li> <li>6. Able to apply the fundamental concepts in their respective engineering fields</li> </ol>
12.	18BECC302	Digital electronics	<ol style="list-style-type: none"> <li>1. Understand number systems and codes</li> <li>2. Understand basic postulates of Boolean algebra and shows the correlation between Boolean expressions</li> </ol>

			<ol style="list-style-type: none"> <li>3. Understand the methods for simplifying Boolean expressions</li> <li>4. Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits</li> <li>5. Understand the concept of memories and programmable logic devices.</li> <li>6. Interpret the concept of synchronous and asynchronous sequential circuits</li> </ol>
13.	18BEBME303	C++ and Data Structures	<ol style="list-style-type: none"> <li>1. Design correct programs to solve problems.</li> <li>2. Choose efficient data structures and apply them to solve problems.</li> <li>3. Analyze the efficiency of programs based on time complexity.</li> <li>4. Prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.</li> <li>5. Understand the concept of function overloading, operator overloading, virtual functions and polymorphism</li> <li>6. Develop programming skill and to solve engineering related problems using C++, Object Oriented Programming (OOP) and Data Structure Concepts</li> </ol>
14.	18BEBME304	Medical Physics	<ol style="list-style-type: none"> <li>1. Understand the fundamental concepts</li> <li>2. Logically analyze any electronic circuit</li> <li>3. Apply the logic in any application</li> <li>4. Understand the specifications of regulators and power supply circuits.</li> <li>5. Apply positive feedback principle and design oscillators.</li> <li>6. Design multivibrator circuits.</li> </ol>
15.	18BEBME305	Fundamentals of Biochemistry	<ol style="list-style-type: none"> <li>1. Demonstrate the concepts of biochemistry of living cells</li> <li>2. Understand the concepts of protein biochemistry</li> <li>3. Explain about functions of each organelles and Transport of substances across biological membranes</li> <li>4. Illustrate the structural and functional properties of carbohydrates, proteins and lipids</li> <li>5. Perceive the concepts of investigation of metabolism.</li> <li>6. Understand the structural and functional properties of various organelles and biomolecules</li> </ol>
16.	18BEBME306	Anatomy and Human Physiology	<ol style="list-style-type: none"> <li>1. Explain basic structure and functions of cells and its organelles</li> <li>2. Demonstrate about anatomy and physiology of various organ systems</li> <li>3. Illustrate eye, ear and Endocrine glands of human</li> <li>4. Explain the interconnect of various organ systems in human body</li> <li>5. Enlighten organs and structures involving in system formation and functions.</li> <li>6. Elucidate special senses in the human body.</li> </ol>

17.	18BEBME311	Bio Chemistry & Human Physiology Laboratory	<ol style="list-style-type: none"> <li>1. Upon completion of this course, students will be able to:</li> <li>2. Solve the quantitative test of different biomolecules</li> <li>3. Label the separation technology of proteins and amino acids.</li> <li>4. Blood group identification</li> <li>5. Estimate of blood glucose</li> <li>6. Estimate of Haemoglobin</li> <li>7. Perceive the Biochemistry laboratory functional parameters</li> </ol>
18.	18BEBME312	Digital Electronics Laboratory	<ol style="list-style-type: none"> <li>1. Analyse different methods used for simplification of Boolean expressions.</li> <li>2. Design and implement Combinational circuits.</li> <li>3. Design and implement synchronous and asynchronous sequential circuits.</li> <li>4. Interpret the concept of synchronous and asynchronous sequential circuits</li> <li>5. Implement shift registers using Flip-flops.</li> <li>6. Apply the knowledge on digital circuits design</li> </ol>
19.	18BEBME401	Probability and Statistics	<ol style="list-style-type: none"> <li>1. Explain the fundamental concepts of probability and standard distributions which can describe real life phenomenon.</li> <li>2. Explain the basic concepts of one and two dimensional random variables and their applications in engineering.</li> <li>3. Apply the concept of testing of hypothesis for small and large samples in real life problems.</li> <li>4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.</li> <li>5. Discuss the notion of sampling distributions and statistical techniques used in engineering and management problems.</li> <li>6. Discuss about the techniques in quality control that model engineering problems.</li> </ol>
20.	18BEBME402	Linear Integrated Circuits	<ol style="list-style-type: none"> <li>1. Define linear and non-linear applications of OP – AMPS</li> <li>2. Create waveforms using OP – AMP Circuits</li> <li>3. Ability to design new analog linear circuits and develop linear IC based Systems.</li> <li>4. Understand the concept of application of waveform generators</li> <li>5. Design ADC and DAC using OP – AMPS</li> <li>6. Analyze special function ICs</li> </ol>
21.	18BEBME403	Biosensors and Transducers	<ol style="list-style-type: none"> <li>1. Have a clear understanding of generalized medical instrumentation system, general properties of input transducers, static and dynamic characteristics of transducers and sensors.</li> <li>2. Demonstrate various transducers and sensors in the course.</li> <li>3. Describe the purpose and methods of measurements.</li> <li>4. Explain the principle of different sensors and its applications</li> </ol>

			<ol style="list-style-type: none"> <li>5. Apply the transducers and sensors learnt in the course in suitable medical contexts.</li> <li>6. Implement working knowledge of some of the transducers and sensors</li> </ol>
22.	18BEBME404	Microprocessor and Microcontroller	<ol style="list-style-type: none"> <li>1. Design assembly language programming (ALP) for different applications for 8085</li> <li>2. Compile assembly language programming (ALP) for different applications for 8086</li> <li>3. Perceive knowledge on advanced processors and controllers</li> <li>4. Create application by Interfacing memory and I/O device with controllers</li> <li>5. Demonstrate the architectures of Reduced Instruction Set Computer (RISC) and Advanced RISC Machine (ARM) processors</li> <li>6. Design and deploy the Interfacing peripherals in real time scenario.</li> </ol>
23.	18BEBME405	Environmental science and Engineering	<ol style="list-style-type: none"> <li>1. To study the nature and facts about environment.</li> <li>2. finding and implementing scientific, technological, economic and political solutions to environmental problems.</li> <li>3. To study the interrelationship between living organism and environment.</li> <li>4. To appreciate the importance of environment by assessing its impact on the human world;</li> <li>5. Envision the surrounding environment, its functions and its value</li> <li>6. To understand the various ecosystems and biodiversity</li> <li>7. To study the tole of engineers in the ecosystem</li> </ol>
24.	18BEBME406	Analog & Digital Communication	<ol style="list-style-type: none"> <li>1. Apply analog and digital communication techniques.</li> <li>2. Use data and pulse communication techniques.</li> <li>3. Analyze Source and Error control coding.</li> <li>4. Gain knowledge on multi-user radio communication.</li> <li>5. Demonstrate core concepts and methods of source and error control coding</li> <li>6. Identify concepts the multi-user radio communication.</li> </ol>
25.	18BEBME411	Microprocessor and Microcontroller Laboratory	<ol style="list-style-type: none"> <li>1. Write ALP Programmes for fixed and Floating Point and Arithmetic operations</li> <li>2. Interface different I/Os with processor</li> <li>3. Generate waveforms using Microprocessors</li> <li>4. Execute Programs in 8051</li> <li>5. Use Serial and Parallel Interface</li> <li>6. Perform A/D and D/A conversion</li> </ol>
26.	18BEBME412	Biosensors and Transducers Lab	<ol style="list-style-type: none"> <li>1. Interpret the characteristics of various biosensors</li> <li>2. Illustrate the importance of the sensors and transducers for medical applications.</li> <li>3. Analyse the characteristics of physiological signals</li> <li>4. Measure skin temperature</li> <li>5. Perform data acquisition of physiological signals</li> <li>6. Choose the biosensors for relevant application</li> </ol>

27.	17BEBME501	Bio Control System	<ol style="list-style-type: none"> <li>1. Knowledge about the application of various mathematical techniques in designing a bio control system</li> <li>2. Ability to create simple models of the physiological system</li> <li>3. Design biomedical control systems</li> <li>4. Know the various order of control system and design system accordingly</li> <li>5. To learn to do the analysis of given system in time domain and frequency domain</li> <li>6. To learn to do the analysis of given system in time domain and frequency domain</li> </ol>
28.	17BEBME502	Medical Instrumentation	<ol style="list-style-type: none"> <li>1. Differentiate different bio potentials and its propagations.</li> <li>2. Describe the electrode behaviour and circuit models</li> <li>3. Illustrate different electrode placement for various physiological recordings</li> <li>4. Design bio amplifier for various physiological recordings</li> <li>5. Explain various technique for non-electrical physiological measurements</li> <li>6. Measure various biochemical parameters.</li> </ol>
29.	17BEBME503	Biomedical Signal Processing	<ol style="list-style-type: none"> <li>1. Design different types of biomedical signals and identify their spectral components.</li> <li>2. Utilize different filters on biomedical signals and judge filter performance.</li> <li>3. Identify physiological interferences and artifacts affecting ECG signal.</li> <li>4. Assess power and correlation spectra of EEG signal.</li> <li>5. Analyze biosignals in time and frequency domains.</li> <li>6. Perform classification and recognition Biosignals</li> </ol>
30.	17BECC504	Professional Ethics, Principles of Management and Entrepreneurship development	<ol style="list-style-type: none"> <li>1. Advanced philosophical knowledge of the profession of recreation and leisure</li> <li>2. Synthesis of trends and issues as related to current professional practice</li> <li>3. Evaluate organizational theories and human resource management principles</li> <li>4. Analyse the information competency</li> <li>5. Follow Ethical practice and ethical management</li> <li>6. Understand Models of Professional Roles</li> </ol>
31.	17BEBME5E01	Professional Elective I Medical Physics	<ol style="list-style-type: none"> <li>1. Analyze the low and high frequency effects of non-ionizing radiation and physics of light.</li> <li>2. Define various clinical applications based on ultrasound wave.</li> <li>3. Explain the process of radioactive nuclide production using different techniques.</li> <li>4. Analyze radiation mechanics involved with various physiological systems.</li> <li>5. Apply the concept of physics in the function of cardiopulmonary system.</li> <li>6. Outline the detrimental effects of radiation and regulations for radiation safety.</li> </ol>

32.	17BEBME5E02	Professional Elective II Biometric systems	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge engineering principles underlying biometric systems.</li> <li>2. Analyze design basic biometric system applications.</li> <li>3. To understand the general principles of design of biometric systems and the underlying trade-offs.</li> <li>4. To recognize personal privacy and security implications of biometrics based identification technology.</li> <li>5. identify issues in the realistic evaluation of biometrics based systems.</li> <li>6. Identify the correct advantages and disadvantages of each biometric method</li> </ol>
33.	17BEBME511	Biosensors and Transducers Lab	<ol style="list-style-type: none"> <li>1. Interpret the characteristics of various biosensors</li> <li>2. Illustrate the importance of the sensors and transducers for medical applications.</li> <li>3. Analyse the characteristics of physiological signals</li> <li>4. Measure skin temperature</li> <li>5. Perform data acquisition of physiological signals</li> <li>6. Choose the biosensors for relevant application</li> </ol>
34.	17BEBME512	Biomedical Instrumentation & Signal Processing Lab	<ol style="list-style-type: none"> <li>1. Create coding for different convolution and correlation techniques.</li> <li>2. Develop preamplifiers and amplifiers for various bio signal recordings.</li> <li>3. Measure various non-electrical parameters using suitable sensors/transducers</li> <li>4. Perform biosignal Acquisition</li> <li>5. Analyse ECG signal</li> <li>6. Understand about SNR improvement</li> </ol>
35.	17BEBME601	Bio-Medical Image processing	<ol style="list-style-type: none"> <li>1. Explain the image fundamentals and mathematical transforms necessary for image processing.</li> <li>2. Illustrate the image enhancement techniques.</li> <li>3. Pre-process the image using filtering techniques</li> <li>4. Utilize image restoration procedures.</li> <li>5. Segment the region of interest in images.</li> <li>6. Apply the image compression procedures.</li> </ol>
36.	17BEBME602	Bio Tech Prosthetic Equipments	<ol style="list-style-type: none"> <li>1. Demonstrate about heart lung machine and artificial heart</li> <li>2. Explain about cardiac assist devices, its continuous monitoring and transmission</li> <li>3. Explain about prosthetic and orthodic devices</li> <li>4. Interpret the need and use of the extracorporeal devices.</li> <li>5. Discuss the types of deafness</li> <li>6. Analyse various materials for Prosthetic and Orthodic devices</li> </ol>
37.	17BEBME603	Diagnostic and Therapeutic Equipment - I	<ol style="list-style-type: none"> <li>1. Utilize different medical devices applied in measurement of parameters related to cardiology, neurology</li> <li>2. Explain about cardiac assist devices, its continuous monitoring and transmission</li> <li>3. Measure signals generated by muscles</li> <li>4. Analyze different types of diathermy units.</li> </ol>

			<ol style="list-style-type: none"> <li>Identify the electrical hazards and Implement methods of patient safety</li> <li>Interpret the need and use of the extracorporeal devices.</li> </ol>
38.	17BECC604	Healthcare and Hospital Management	<ol style="list-style-type: none"> <li>Explain various information management systems and relative supportive services.</li> <li>Interpret market related research processes in healthcare and hospital sectors.</li> <li>Illustrate the quality and safety aspects in hospital.</li> <li>Demonstrate about human resource management in hospital</li> <li>Understand about NABH and NABL</li> <li>Explain the importance of supportive services</li> </ol>
39.	17BEBME6E02	Professional Elective-III Telehealth Technology	<ol style="list-style-type: none"> <li>Apply multimedia technologies in telemedicine.</li> <li>Explain Protocols behind encryption techniques for secure transmission of data.</li> <li>Utilize telehealth in healthcare.</li> <li>Outline the basic concepts involved in telemetry based transmission and reception</li> <li>Discuss the communication devices and Networks of telemedicine.</li> <li>Describe telehealth systems for secure transmission of medical data and retrieval of telemedicine based information.</li> </ol>
40.	17BEBME6E04	Professional Elective-IV Biosignal Conditioning Circuits	<ol style="list-style-type: none"> <li>Elaborate the fundamentals of operational amplifier circuits</li> <li>Apply the various applications using operational amplifiers.</li> <li>Use the applications of opamp</li> <li>Distinguish A/D and D/A conversion</li> <li>Design the filter circuits for various frequency range</li> <li>Explain the need of isolation amplifier</li> </ol>
41.	17BEBME611	Bio-Medical Image processing Lab	<ol style="list-style-type: none"> <li>Apply various pre-processing techniques in Medical Images.</li> <li>Outline enhancement and transformation of Medical Images.</li> <li>Simplify and reconstruct medical images.</li> <li>Use MATLAB tool for image processing application</li> <li>Perform Image analysis</li> <li>Perform image compression</li> </ol>
42.	17BEBME612	Diagnostic and Therapeutic Equipments Lab	<ol style="list-style-type: none"> <li>Measure different bioelectrical signals using various methods</li> <li>Assess different non-electrical parameters using various methodologies</li> <li>Illustrate various diagnostic and therapeutic techniques.</li> <li>Handle therapeutic equipment</li> <li>Design ECG amplifier</li> <li>Design and simulate by using Lab View</li> </ol>
43.	16BECC701	Professional Ethics, Principles of Management and	<ol style="list-style-type: none"> <li>Advanced philosophical knowledge of the profession of recreation and leisure</li> <li>Synthesis of trends and issues as related to current professional practice</li> </ol>

		Entrepreneurship development	<ol style="list-style-type: none"> <li>3. Evaluate organizational theories and human resource management principles</li> <li>4. Analyse the information competency</li> <li>5. Follow Ethical practice and ethical management</li> <li>6. Understand Models of Professional Roles</li> </ol>
44.	16BEBME702A	Virtual Instrumentation Design for medical system /	<ol style="list-style-type: none"> <li>1. Illustrate programming concepts of virtual instruments.</li> <li>2. Compile programming structure in LabVIEW.</li> <li>3. Understand the use of VI for data acquisition.</li> <li>4. analyze different types of interfaces.</li> <li>5. Choose data from hardware systems.</li> <li>6. Develop VI programs for specific applications</li> </ol>
45.	16BEECOE01	Open Elective-I Real time embedded Systems	<ol style="list-style-type: none"> <li>1. Ability to understand embedded systems, its hardware and software.</li> <li>2. Gain knowledge about devices and buses used for embedded networking.</li> <li>3. Gain knowledge about task management.</li> <li>4. Gain knowledge about semaphore management and message passing.</li> <li>5. Gain knowledge about memory management.</li> <li>6. To learn about semaphore management and message passing</li> </ol>
46.	16BEECOE03	Open Elective-II Neural Networks And Its Applications	<ol style="list-style-type: none"> <li>1. Understand the basic concepts of neural networks and its applications in various domains</li> <li>2. Gain knowledge about learning process in Neural Networks</li> <li>3. Apply perception concept in design</li> <li>4. Design using ART phenomena</li> <li>5. Gain knowledge on SOM concepts</li> <li>6. Ability to develop the use of Soft Computing to solve real-world problems</li> </ol>
47.	16BEBME7E03	Professional Elective-IV Patient And Devices Safety	<ol style="list-style-type: none"> <li>1. Know Patient Orientation for Total Patient Satisfaction. 5S techniques</li> <li>2. Understand ICRP regulations for radiation safety</li> <li>3. Know Radiation safety and Safety precautions</li> <li>4. Know hazardous effects of radiation</li> <li>5. Realise allowed levels of radiation</li> <li>6. Learn about Disposal of Biological waste.</li> </ol>
48.	16BEBME711A	Virtual Instrumentation Design for medical system Lab	<ol style="list-style-type: none"> <li>1. Study about Programming Techniques</li> <li>2. Study about Data Acquisition and inter facing techniques</li> <li>3. Do programming for process control and other applications</li> <li>4. Use D/A acquisition interface</li> <li>5. Use serial communication interface</li> <li>6. Use Lab view software for biomedical signal analysis</li> </ol>
49.	16BEBME8E08	Professional Elective-V Intellectual Property Rights	<ol style="list-style-type: none"> <li>1. Review an intellectual property portfolio and comprehend the extent of their protection.</li> <li>2. Describe the registration of copy rights, trademarks, patents and industry</li> <li>3. Develop a business plan that advances the value of their intellectual property portfolio</li> </ol>

			<ol style="list-style-type: none"> <li>4. Analyse International convention relating to Intellectual Property</li> <li>5. Distinguish Indian Position Vs WTO and Strategies relating to Intellectual Property</li> <li>6. Explain some of the limits of their intellectual property rights and comprehend some basic legal pitfalls</li> </ol>
50.	16BEBME8E	Professional Elective-VI Bio MEMS	<ol style="list-style-type: none"> <li>1. Discuss various MEMS fabrication techniques.</li> <li>2. Explain different types of sensors and actuators and their principles of operation at the microscale level.</li> <li>3. Apply MEMS in different field of medicine.</li> <li>4. Learn various MEMS fabrication techniques.</li> <li>5. Understand different types of sensors and actuators and their principles of operation at the microscale level.</li> <li>6. Know the application of MEMS indifferent</li> </ol>

Name of the Department: **Chemical Engineering**

**Course:** B.Tech. Chemical Engineering

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BTCE101	Mathematics-I	<p>After successfully completing the course, the student will have a good understanding of the following topics and their applications:</p> <ol style="list-style-type: none"><li>1. In rank, consistency and its inverse in Engineering fields.</li><li>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.</li><li>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.</li><li>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.</li><li>5. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.</li><li>6. To analyse and evaluate the basic concepts of mathematics like matrix operations, vectors, Fourier series etc in their specific fields.</li></ol>
2.	19BTCE102	English	<p>Students undergoing this course will be able to</p> <ol style="list-style-type: none"><li>1. Describe English language for communication: verbal &amp; non-verbal.</li><li>2. Express comprehension and acquisition of speaking &amp; writing ability.</li><li>3. Improve the student confidence in using English language in real life situations.</li><li>4. Develop word power: lexical, grammatical and communication competence.</li><li>5. To prepare the students to write business letters and other forms of technical writing.</li><li>6. Demonstrate the students to prepare for oral communication in formal contexts.</li></ol>
3.	19BTCE103	Chemistry – I	<ol style="list-style-type: none"><li>1. Appreciate quantum theory of chemical systems.</li><li>2. Appreciate aliphatic chemistry</li><li>3. Describe the concepts of stereochemistry</li><li>4. Write simple mechanisms</li><li>5. To synthesis of organic molecules</li><li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li></ol>
4.	19BTCE141	Physics	<p>Upon completion of this course, the students will be able to</p>

			<ol style="list-style-type: none"> <li>1. List the fundamentals of Bragg's Law, interference, diffraction and its applications.</li> <li>2. Understand the principles of lasers, types of lasers and its applications and also gain the knowledge of fiber optics.</li> <li>3. Integrate the basic concepts of electromagnetism, Maxwell equations Polarization, etc.</li> <li>4. List the knowledge of dielectrics &amp; magnetic properties of materials.</li> <li>5. Analyze about the some of the basic laws and concepts of quantum mechanics, uncertainty principle and scanning electron microscope.</li> <li>6. Illustrate the basic concepts of physics and its applications.</li> </ol>
5.	19BTCE111	Engineering Graphics	<ol style="list-style-type: none"> <li>1. Introduction to engineering design and its place in society</li> <li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li> <li>3. Exposure to engineering communication effectively.</li> <li>4. Exposure to 3D free hand sketching.</li> <li>5. Acquired the knowledge of projections of points, lines and plane surfaces.</li> <li>6. Understand the basic concept of projection of solids.</li> </ol>
6.	19BTCE201	Mathematics-II	<ol style="list-style-type: none"> <li>1. To be able to solve equations using Laplace and Fourier transform</li> <li>2. To solve first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.</li> <li>3. To evaluate second order ordinary differential equations in various methods.</li> <li>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.</li> <li>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.</li> <li>6. The Learners can equip themselves in the transform techniques and solve ODEs and PDEs.</li> </ol>
7.	19BTCE202	Chemistry-II	<ol style="list-style-type: none"> <li>1. To apply the various unit process</li> <li>2. Extend the principles of reaction mechanisms</li> <li>3. To apply the knowledge on chemical reactions</li> <li>4. To prepare soaps</li> <li>5. To analyses the effect of pigments</li> <li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li> </ol>
8.	19BTCE203	Thermodynamics I	<p>On completion of the course the students are expected to</p> <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of thermodynamics.</li> <li>2. Apply mass and energy balances for open systems.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Evaluate the properties of non-ideal gases.</li> <li>4. Solve problems involving liquefaction, refrigeration and different power cycles.</li> <li>5. To apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.</li> <li>6. To identify and formulate power production based on the fundamentals laws of thermal engineering.</li> </ol>
9.	19BTCE241	Electrical & Electronics Engineering	<p>At the end of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand and analyse basic electric and magnetic circuits.</li> <li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li> <li>3. Analysis the real time application of transformer.</li> <li>4. Evaluate the various digital circuits in real time applications.</li> <li>5. Analysis various semiconductor devices in real time applications.</li> <li>6. Reproduce the Measuring Instruments and Electrical Installation.</li> </ol>
10.	19BTCE242	Programming For Problem Solving	<p>The course will enable the students</p> <ol style="list-style-type: none"> <li>1. To formulate simple algorithms for arithmetic and logical problems</li> <li>2. To translate the algorithms to programs (in C language)</li> <li>3. To test and execute the programs and correct syntax and logical errors</li> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. Touse arrays, pointers and structures to formulate algorithms and programs</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
11.	19BTCE211	Chemistry laboratory	<ol style="list-style-type: none"> <li>1. List steps for identifying simple organic compounds</li> <li>2. Use different analytical instruments</li> <li>3. Identify reaction rate parameters</li> <li>4. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc</li> <li>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.</li> <li>6. Students will be able to gain knowledge about various analysis</li> </ol>

12.	18BTCE301	Heat Power Engineering	<ol style="list-style-type: none"> <li>1. Acquire knowledge of HEAT POWER Engineering and be able to discriminate, evaluate, analyse and integrate existing and new knowledge</li> <li>2. Describe basic working principles of gas turbine and diesel engine power plants.</li> <li>3. Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventional steam generators (boilers)</li> <li>4. Analyse performance of various refrigeration cycles and air conditioning systems</li> <li>5. Describe construction, working of various types of reciprocating</li> <li>6. Discuss the all other performance parameters of I.C Engine.</li> </ol>
13.	18BTCE302	Fluid Mechanics	<ol style="list-style-type: none"> <li>1. Apply the basic concepts of fluid mechanics and to solve dimensional analysis problems.</li> <li>2. Understanding the applications of flow statics, fluid flow phenomena.</li> <li>3. Creating fluid flow reactors and solve problems on fluid flow measurements.</li> <li>4. Evaluating the pump efficiency, head developed and pressure drop.</li> <li>5. Creating problems related to mass, momentum and energy balances in fluid flow.</li> <li>6. Analysing flow behaviour of solid and liquid and to demonstrate the understanding of packed and fluidized bed.</li> </ol>
14.	18BTCE303	Chemical Process Calculations	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. Analysing the concentration, degree of saturation and dew point of vapor -gas mixture at the given temperature and pressure using humidity chart.</li> <li>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.</li> <li>5. Understanding the combined steady state material and Energy balance for simple processes like distillation, evaporation and combustion.</li> <li>6. Remembering the law of conservation of mass for different batch and continuous unit operations.</li> </ol>
15.	18BTCE304	Mechanical Operations	<ol style="list-style-type: none"> <li>1. Understanding the Particle size, shape and surface area computation by both differential, cumulative analysis.</li> <li>2. Analysing the pressure due to storage of particles and formulate the method of transportation and fine particle recovery.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Evaluating the terminal settling velocity, settling time and calculate the thickener area.</li> <li>4. Calculate the pressure drop in filters, filter medium resistance and cake resistance.</li> <li>5. Creating the power required by mixers using power number and Reynolds number.</li> <li>6. Applying the size reduction techniques of solids by selecting proper equipment such as crushers, grinders, etc.</li> </ol>
16.	18BTCE305	Thermodynamics - II	<ol style="list-style-type: none"> <li>1. Applying fundamental concepts of thermodynamics to engineering applications.</li> <li>2. Remembering thermodynamics to conversion devices.</li> <li>3. Analysing application of thermodynamics to phase equilibria and reaction equilibria.</li> <li>4. Creating the chemical engineering equipment in processes.</li> <li>5. Understanding thermodynamic properties of substances in gas and liquid states</li> <li>6. Evaluating thermodynamic efficiency of various energy related processes.</li> </ol>
17.	18BTCE401	Heat Transfer	<ol style="list-style-type: none"> <li>1. Remembering the concepts of heat transfer.</li> <li>2. Understanding mechanisms of conduction, convection and radiation.</li> <li>3. Analysing the performance of heat exchange equipment &amp; evaporators.</li> <li>4. Evaluating components subjected to thermal loading.</li> <li>5. Applying the heat transfer concept in parallel &amp; counter current flow.</li> <li>6. Analysing the effect of heat transfer in boiling and evaporators.</li> </ol>
18.	18BTCE402	Mass Transfer - I	<ol style="list-style-type: none"> <li>1. Remembering the diffusional mass transfer concepts.</li> <li>2. Understanding the mechanism of crystallization and absorption.</li> <li>3. Evaluating the interphase and different analogies of mass transfer.</li> <li>4. Analysing the operation of drying.</li> <li>5. Creating the design of the equipment.</li> <li>6. Applying recent developments in mass transfer operation.</li> </ol>
19.	18BTCE403	Chemical Process Industries	<ol style="list-style-type: none"> <li>1. Identifies the contemporary technologies in water treatment and label the process economics in salt and sulphur-based industries.</li> <li>2. Design the production methodology of oil industries and analyse the efficiency of the products.</li> <li>3. Analyse and formulate the chemical processes and economics involved in the carbohydrate industries.</li> <li>4. Describe the flow sheets of manufacture process of pulp based, leather industries and engineering problems faced in the industries.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Evaluate the surface coating &amp; cement industry processes to justify their appropriate production techniques and their handling processes.</li> <li>6. Can describe various manufacturing processes used in chemical process industries.</li> </ol>
20.	18BTCE404	Material Science And Engineering	<ol style="list-style-type: none"> <li>1. Comprehend the criterion for selection of materials for chemical process industries.</li> <li>2. Outline the properties and applications of smart materials and nano and bio materials.</li> <li>3. Apply the knowledge about various materials used in chemical process industries.</li> <li>4. Select materials for high temperature and Sour service and gain knowledge of modern engineering materials.</li> <li>5. Be able to qualitatively derive a material's Young's modulus from a potential energy curve.</li> <li>6. Be able to describe a polymer's elastic behaviour above and below the glass transition.</li> </ol>
21.	18BTCE405	Engineering Economics And Financial Management	<ol style="list-style-type: none"> <li>1. To know the fundamentals of cost analysis and economics.</li> <li>2. To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.</li> <li>3. To make the students to understand capital market, break-even point analysis and depreciation.</li> <li>4. Evaluate the economic theories, cost concepts and pricing policies.</li> <li>5. Understand accounting systems and analyse financial statements using ratio analysis.</li> <li>6. Understand the measures of national income, the functions of banks and concepts of globalization.</li> </ol>
22.	18BTCE406	Environmental Sciences	<ol style="list-style-type: none"> <li>1. Remembering the importance of natural resources.</li> <li>2. Analysing the importance of biodiversity.</li> <li>3. Creating awareness with the various ecosystems.</li> <li>4. Applying the environmental principles in the field of engineering and technology.</li> <li>5. Evaluating and minimizing the different causes of pollutions.</li> <li>6. Understanding and analysing the social issues.</li> </ol>
23.	17BTCE501	Chemical Reaction Engineering - I	<ol style="list-style-type: none"> <li>1. Evaluating the selection process of the reactor for the reaction and its design.</li> <li>2. Applying the principles of reaction kinetics and formulate rate equations and analyse the batch reactor data.</li> <li>3. Analysing RTD in non-ideal flow reactors and calculation of conversion.</li> <li>4. Understanding the ideal reactor concepts and to develop the performance equation to workout conversion and space time.</li> <li>5. Remembering the reactor for the desired reaction and its design.</li> <li>6. Creating reactor performance when the temperature is not uniform within the reactor.</li> </ol>

24.	17BTCE502	Mass Transfer - 1	<ol style="list-style-type: none"> <li>1. Understand diffusional operations and theories of mass transfer.</li> <li>2. Understand the concept of interphase mass transfer.</li> <li>3. Understand the concept gas-liquid mass transfer operations like humidification.</li> <li>4. Apply the knowledge gained in mass transfer to perform simple calculations in drying.</li> <li>5. Apply the knowledge gained in mass transfer to perform simple calculations in crystallization process.</li> <li>6. Calculate tower height and number of transfer units for absorption process.</li> </ol>
25.	17BTCE503	Chemical Process Plant Safety And Hazard	<ol style="list-style-type: none"> <li>1. Understanding the awareness of plant safety standards, codes and MSDS in handling and storage of chemicals.</li> <li>2. Analysing the legal aspects related to safety and emergency studies to know the basic rules and requirements which govern the chemical industries.</li> <li>3. Evaluating the safety in industries and the various methods of safety measures and risk analysis in the industry.</li> <li>4. Applying the skill in classifying chemical, fire, explosion hazards and to understand the occupational diseases.</li> <li>5. Remembering safety operations and process by undergoing HAZOP and HAZAN studies.</li> <li>6. Analysing the accident causes, costs, prevention techniques, accident proneness and case studies.</li> </ol>
26.	17BTCE504	Instrumental Methods Of Analysis	<ol style="list-style-type: none"> <li>1. Analysing the principles of electromagnetic radiation and classification of instrumental methods.</li> <li>2. Understanding the importance of AAS and NMR spectroscopy in chemical analysis.</li> <li>3. Remembering the principles and applications of UV, Visible, IR Spectroscopy and Photometric titrations.</li> <li>4. Understanding the principles and applications of chromatographic methods.</li> <li>5. Applying the knowledge about thermo gravimetric instruments.</li> <li>6. Evaluating the working principles of different types of instruments and their applications.</li> </ol>
27.	17BTCE5E04	Fertilizer Technology	<ol style="list-style-type: none"> <li>1. Understanding the role of chemical engineers in fertilizer industries and develop block diagrams and flow charts for manufacture of different chemicals.</li> <li>2. Applying knowledge in the manufacture of plant nutrients, agrichemicals and fertilizers.</li> <li>3. Remembering the unit operations/ processes in nitrogen, phosphorous, potassium and sulphur-based fertilizer industries.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Evaluating principles of chemical engineering in innovating novel fertilizers to bring in sustainability in agriculture.</li> <li>5. Creating understanding about unit process and operations in various chemical industries.</li> <li>6. Analysing manufacturing processes of organic and Inorganic Fertilizers and its applications.</li> </ol>
28.	17BTCE601	Chemical Reaction Engineering - II	<ol style="list-style-type: none"> <li>1. Analysing difference between various RTD curves and predict the conversion from a non - ideal reactor using tracer information.</li> <li>2. Remembering rate laws for heterogeneous reactions.</li> <li>3. Creating reactors for non-catalytic and catalytic reactions.</li> <li>4. Applying the ideal reactor concepts and heterogeneous reactors.</li> <li>5. Evaluating the tower for gas liquid operations with and without chemical reaction.</li> <li>6. Understanding the basics of catalysis and industrial catalytic reactors such as gas-solid reactors.</li> </ol>
29.	17BTCE602	Mass Transfer - II	<ol style="list-style-type: none"> <li>1. Understand absorption and distillation operations and select methods of separation of mixtures based on mass transfer concepts.</li> <li>2. Design a distillation tower.</li> <li>3. Perform calculations in adsorption operation.</li> <li>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.</li> <li>5. Use the phase equilibrium concepts in mass transfer related problems.</li> <li>6. Solve problems related to liquid-liquid and solid-liquid extraction.</li> </ol>
30.	17BTCE603	Process Dynamics Control And Instrumentation	<ol style="list-style-type: none"> <li>1. Understanding the prerequisites of control strategies to design different process control systems.</li> <li>2. Evaluating the suitable controllers for different chemical process.</li> <li>3. Analysing the closed loop response of control loops and characteristics of control values.</li> <li>4. Remembering the tuning procedures and advanced control techniques.</li> <li>5. Applying the control systems into stability.</li> <li>6. Creating a control strategy for the control of mass and heat transfer equipment using advanced controllers.</li> </ol>
31.	17BTCE604	Process Economics For Chemical Engineering	<ol style="list-style-type: none"> <li>1. Gain knowledge on cost and asset accounting, time value of money, profitability, alternative investments.</li> <li>2. Demonstrate knowledge of the difference between profit/loss and cash flow.</li> <li>3. Demonstrate the ability to analyse projects for profitability.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Demonstrate understanding of cost estimation.</li> <li>5. Demonstrate ability to assess the impact of economic constraints on engineering solutions.</li> <li>6. Demonstrate ability to apply the knowledge of cost estimation and profitability evaluation to conduct and present the results of a case study.</li> </ol>
32.	17BTCE6E01	Fluidization Engineering	<ol style="list-style-type: none"> <li>1. Remembering the fluidization behaviour.</li> <li>2. Evaluating pressure drop, bubble size, void age, heat and mass transfer rates for the fluidized beds.</li> <li>3. Applying the model equations for fluidized beds.</li> <li>4. Creating the gas-solid fluidized bed reactors.</li> <li>5. Understanding the fundamental of fluidization.</li> <li>6. Analysing the fundamentals of fluidization engineering, different regimes, classification of particles.</li> </ol>
33.	17BTCE6E02	Petroleum Refining Engineering	<ol style="list-style-type: none"> <li>1. Remembering crude oils consist of and characterized based on their physical properties.</li> <li>2. Applying Fundamental and methodologies in the petroleum refining processes.</li> <li>3. Analysing the processes used in petroleum refining.</li> <li>4. Understanding working of petroleum refinery and all refining processes and the resulting refinery products.</li> <li>5. Evaluating the various treatment techniques of petroleum.</li> <li>6. Creating familiarization with upgrading process of petroleum products.</li> </ol>
34.	16BTCE702	Transport Phenomena	<ol style="list-style-type: none"> <li>1. Applying the shell momentum balances and velocity distribution in laminar flow and understand equation of continuity and motion.</li> <li>2. Creating the shell energy balances and temperature distributions in solids and apply the equations of change to solve heat transfer problems.</li> <li>3. Understanding the shell mass balance and concentration distributions in systems involving diffusion and reactions.</li> <li>4. Analysing the analogy between the transports processes of heat, momentum and mass transfer.</li> <li>5. Evaluating the shell mass balance and concentration distributions in systems involving diffusion and reactions.</li> <li>6. Remembering the analogy between the transports processes of heat, momentum and mass transfer.</li> </ol>
35.	16BTCE7E01	Electrochemical Engineering	<ol style="list-style-type: none"> <li>1. 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.</li> <li>2. Evaluate the potential of electrochemical systems based on thermodynamic data and the concept of half-cells. Apply electrical circuit elements to</li> </ol>

			<p>model electrochemical systems in order to calculate energy balances and to estimate efficiencies.</p> <ol style="list-style-type: none"> <li>3. apply knowledge of electrokinetic phenomena to design microfluidic unit operations.</li> <li>4. Use of technical measures to characterize properties of galvanic elements and capacitors.</li> <li>5. Demonstrate fundamental knowledge of major industrial electrochemical processes and electrochemical reactor design including economic and environmental considerations.</li> <li>6. Define and explain the concepts of Electrical Potential, Electrical Field, Electrostatic Work, Voltage, Current, Electrochemical Potential, Activation Energy, Electrode &amp; Electrochemical Equilibrium.</li> </ol>
36.	16BTCE8E03	Pollution Control In Process Industries	<ol style="list-style-type: none"> <li>1. Understanding the effects of pollutants to the environment.</li> <li>2. Evaluating the various treatment technologies for water/wastewater, air effluents and solid waste released from chemical industries.</li> <li>3. Applying the basic concepts of pollution control in industries</li> <li>4. Remembering the development of various unit operation.</li> <li>5. Analysing the problems of pollution and suggest suitable treatment methodology.</li> <li>6. Creating understanding about water, air, light pollution control.</li> </ol>
37.	16BTCE8E08	Process Modelling And Simulation	<ol style="list-style-type: none"> <li>1. Remembering first principles and constitutive laws to develop ordinary or partial differential equations by incorporating valid assumptions for both macroscopic and microscopic systems.</li> <li>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.</li> <li>3. Evaluating the mathematical model for simple flow systems and Homogeneous and Heterogeneous reaction kinetics.</li> <li>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.</li> <li>5. Applying computational techniques to solve the process models.</li> <li>6. Understanding the fundamentals of modelling and their applications in energy equations and phase equilibrium kinetics.</li> </ol>

Name of the Department: **Civil Engineering**

**Course:** B.E. Civil Engineering

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BECE101	Mathematics I (Calculus, Multivariable Calculus & Linear Algebra)	After successfully completing the course, the student will have a good understanding of the following topics and their applications: <ol style="list-style-type: none"><li>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.</li><li>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</li><li>3. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.</li><li>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.</li><li>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.</li><li>6. This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus</li></ol>
2.	19BECE141	CHEMISTRY-I	<ol style="list-style-type: none"><li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li><li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li><li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li><li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li><li>5. List major chemical reactions that are used in the synthesis of molecules.</li><li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li></ol>
3.	19BECE142	Basic Electrical Engineering	<ol style="list-style-type: none"><li>1. Understand and analyse basic electric and magnetic circuits.</li><li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li><li>3. Attributing the electrical machines and transformer</li><li>4. Evaluate the various digital circuits in real time applications.</li></ol>

			<ol style="list-style-type: none"> <li>5. Analysis various semiconductor devices in real time applications.</li> <li>6. Reproduce the Measuring Instruments and Electrical Installation.</li> </ol>
4.	19BECE111	Engineering Graphics And Design	<ol style="list-style-type: none"> <li>1. Introduction to engineering design and its place in society</li> <li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li> <li>3. Exposure to engineering communication effectively.</li> <li>4. Exposure to 3D free hand sketching.</li> <li>5. Acquired the knowledge of projections of points, lines and plane surfaces.</li> <li>6. Understand the basic concept of projection of solids.</li> </ol>
5.	19BECE201	Mathematics –II	<p>The students will learn:</p> <ol style="list-style-type: none"> <li>1. Solve first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.</li> <li>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.</li> <li>3. Understand how to solve the given standard partial differential equations.</li> <li>4. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.</li> <li>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.</li> <li>6. To understand the fundamentals and basic concepts in vector calculus, ODE, complex functions and problems related to engineering applications by using these techniques.</li> </ol>
6.	19BECE202	English	<p>Students undergoing this course will be able to</p> <ol style="list-style-type: none"> <li>1 Describe English language for communication: verbal &amp; non –verbal.</li> <li>2 Express comprehension and acquisition of speaking &amp; writing ability.</li> <li>3 Improve the student confidence in using English language in real life situations.</li> <li>4 Develop word power: lexical, grammatical and communication competence.</li> <li>5 To prepare the students to write business letters and other forms of technical writing.</li> <li>6 Demonstrate the students to prepare for oral communication in formal contexts.</li> </ol>
7.	19BECE241	Mechanics and Mechanics of Solids	<ol style="list-style-type: none"> <li>1. Illustrate the vectorial and scalar representation of forces and moments.</li> <li>2. Analyse the rigid body in equilibrium.</li> <li>3. Evaluate the static forces exerted in rigid body.</li> <li>4. Infer the concept of free body diagram.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Summarize the various properties of stress and strain.</li> <li>6. Apply the knowledge gained from this course to solve the relevant problems in engineering stream.</li> </ol>
8.	19BECS242	Programming For Problem Solving	<p>The course will enable the students</p> <ol style="list-style-type: none"> <li>1. To formulate simple algorithms for arithmetic and logical problems</li> <li>2. To translate the algorithms to programs (in C language)</li> <li>3. To test and execute the programs and correct syntax and logical errors</li> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
9.	19BECE211	Workshop / Manufacturing Practices Laboratory	<ol style="list-style-type: none"> <li>1. The students will gain knowledge of the different manufacturing processes.</li> <li>2. To fabricate components using different materials.</li> <li>3. Students will be able to fabricate components with their own hands.</li> <li>4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances</li> <li>5. By assembling different components with different processes.</li> <li>6. They will be able to produce small devices of their interest.</li> </ol>
10.	18BECE301	Mathematics – III	<ol style="list-style-type: none"> <li>1. Lucid idea about Laplace Transforms.</li> <li>2. Different Transform techniques like Z transforms.</li> <li>3. The functions which transform a finite set into another finite set which relates to input and output functions in computer science.</li> <li>4. Logic sentence express it in terms of predicates, quantifiers, and logical connectives.</li> <li>5. To develop the given problem as graph networks and solve with techniques of graph theory.</li> <li>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.</li> </ol>
11.	18BECE302	Basic Electronics	<ol style="list-style-type: none"> <li>1. Know broadly the concepts and functionalities of the electronic devices, tools and instruments</li> </ol>

			<ol style="list-style-type: none"> <li>2. Understand use, general specifications and deploy abilities of the electronic devices, and assemblies.</li> <li>3. Gain confidence in handling and usage of electronic devices, tools and instruments in engineering applications</li> <li>4. Gain knowledge on the principles and procedure for the analysis of Circuit theory.</li> <li>5. Understand the basic concepts in DC (circuit) and AC (circuit) Fundamentals.</li> <li>6. Understand the basic principles of electromagnetic fields.</li> </ol>
12.	18BECE303	Biology For Engineers	<ol style="list-style-type: none"> <li>1. Summarize the cell structures and its functions</li> <li>2. Explain the Biomolecules functions</li> <li>3. Classify the communicable and non-communicable human diseases</li> <li>4. Illustrate the different organ function tests</li> <li>5. Tell the applications of biology in environmental applications.</li> <li>6. Describe the applications of biology in concrete technology.</li> </ol>
13.	18BECE304	Energy Science & Engineering	<ol style="list-style-type: none"> <li>1. List and generally explain the main sources of energy and their primary applications nationally and internationally.</li> <li>2. Have basic understanding of the energy sources and scientific concepts/principles behind them.</li> <li>3. Understand effect of using these sources on the environment and climate.</li> <li>4. 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.</li> <li>5. List and describe the primary renewable energy resources and technologies.</li> <li>6. To quantify energy demands and make comparisons among energy uses, resources, and technologies.</li> </ol>
14.	18BECE305	Introduction To Civil Engineering	<ol style="list-style-type: none"> <li>1. Introduction to what constitutes Civil Engineering.</li> <li>2. Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering.</li> <li>3. Highlighting the depth of engagement possible within each of these areas.</li> <li>4. Exploration of the various possibilities of a career in this field.</li> <li>5. Understanding the vast interfaces this field has with the society at large.</li> <li>6. Providing inspiration for doing creative and innovative work.</li> </ol>
15.	18BECE306	Engineering Mechanics	<ol style="list-style-type: none"> <li>1. Use scalar and vector analytical techniques for analysing forces in statically determinate structures.</li> <li>2. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.</li> <li>3. Apply basic knowledge of maths and physics to solve real-world problems.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Understand measurement error, and propagation of error in processed data.</li> <li>5. Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).</li> <li>6. Understand basic dynamics concepts – force, momentum, work and energy.</li> </ol>
16.	18BECE307	Effective Technical Communication	<ol style="list-style-type: none"> <li>1. Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.</li> <li>2. Enhance their reading texts critically and analytically.</li> <li>3. Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument.</li> <li>4. Improve their lexical, grammatical and communicative competence.</li> <li>5. Will gain knowledge in creative, critical, analytical and evaluative writing.</li> <li>6. Enrich the ability to face interviews with confidence.</li> </ol>
17.	18BECE311	Computer-Aided Civil Engineering Drawing	<ol style="list-style-type: none"> <li>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.</li> <li>2. Develop parametric design and the conventions of formal engineering drawing.</li> <li>3. Produce and interpret 2D &amp; 3D drawings.</li> <li>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.</li> <li>5. Do a detailed study of an engineering artefact.</li> <li>6. Develop drawings for conventional structures using practical norms.</li> </ol>
18.	17BECE501	Structural Analysis I	<ol style="list-style-type: none"> <li>1. Use various classical methods for analysis of indeterminate structures.</li> <li>2. Determine the effect of support settlements for indeterminate structures.</li> <li>3. Apply the concepts of ILD and moving loads on determinate structures.</li> <li>4. Apply the concept of equivalent UDL.</li> <li>5. Determine the reversal of stresses in trusses using ILD.</li> <li>6. To Analyse the building using different methods available for designing and analysing.</li> </ol>
19.	17BECE502	Design of RC Structures I	<ol style="list-style-type: none"> <li>1. Apply the fundamental concepts of working stress method and limit state method.</li> <li>2. Use IS code of practice for the design of concrete elements.</li> <li>3. Design the beams, slab, stairs, column and footing.</li> <li>4. Draw detailing of various RCC structural elements.</li> </ol>

			<ol style="list-style-type: none"> <li>5. understand the behaviour of columns subjected to eccentric load and use of interaction diagrams</li> <li>6. gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage</li> </ol>
20.	17BECE503	Solid Mechanics II	<ol style="list-style-type: none"> <li>1. Apply the principle of virtual work.</li> <li>2. Determine deflection of a beam for various loading conditions.</li> <li>3. Apply unit load method to find the deflection of truss.</li> <li>4. Determine different stresses developed in thick cylinders.</li> <li>5. Visualize the behaviour of column for combined bending and axial loading.</li> <li>6. Determine the deflections if beam using different methods</li> </ol>
21.	17BECE504	Environmental Engineering - I	<ol style="list-style-type: none"> <li>1. Identify the source of water and water demand.</li> <li>2. Apply the water treatment concept and methods.</li> <li>3. Apply water distribution processes and operation and maintenance of water supply.</li> <li>4. Prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data.</li> <li>5. Gain the knowledge of distribution system and their methods.</li> <li>6. Understand the design of water supply lines</li> </ol>
22.	17BECE505A	Water Resources Engineering	<ol style="list-style-type: none"> <li>1. Incorporate the analytical abilities in the planning and design of water resource systems.</li> <li>2. Apply the knowledge on reservoir planning and investigation</li> <li>3. Design of reservoir, operation and sedimentation</li> <li>4. the skills in modelling of flood flows and flood routing</li> <li>5. Gained the knowledge about different water structures.</li> <li>6. To know about the unit hydrograph and its applications.</li> </ol>
23.	17BECE505B	Building Services	<ol style="list-style-type: none"> <li>1. Various machineries of construction, electrical systems in building,</li> <li>2. Design and principle of illumination, refrigeration principle</li> <li>3. Application Various fire safety installations.</li> <li>4. Different electrical systems in buildings</li> <li>5. Different motors and generators and services used in concrete mixers.</li> <li>6. Will gain the knowledge of the refrigerators and its applications.</li> </ol>
24.	17BECE5E006	Foundation Engineering	<ol style="list-style-type: none"> <li>1. Analyse and design any kind of sheet pile wall system including coffer dam.</li> <li>2. Analyse and design well foundation including complete stability analysis.</li> <li>3. Estimate soil parameters under dynamic conditions including machine foundations.</li> <li>4. Design a suitable foundation system for any kind of problematic soils.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Analyse the stability of any kind of slope by using both theoretical and graphical methods.</li> <li>6. Know the fundamentals of soil dynamics and its application to machine foundation analysis including coal provisions.</li> </ol>
25.	17BECE511	Strength Of Materials Laboratory	<ol style="list-style-type: none"> <li>1. Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.</li> <li>2. Determine the strength of coarse aggregates.</li> <li>3. Find the compressive strength of concrete cubes and bricks.</li> <li>4. Find stiffness of open coiled and closed coiled springs.</li> <li>5. Determine the physical properties of given coarse aggregates, fine aggregates and</li> <li>6. Determine the physical properties of given cement samples.</li> </ol>
26.	17BECE512	Applied Hydraulics & Hydraulic Machinery Laboratory	<ol style="list-style-type: none"> <li>1. Measure discharge in pipes.</li> <li>2. Determine the energy loss in conduits.</li> <li>3. Demonstrate the characteristics curves of pumps</li> <li>4. Demonstrate the characteristics curves of turbines.</li> <li>5. Carry out discharge measurements in open channel.</li> <li>6. Brief knowledge of different types of pumps and its applications.</li> </ol>
27.	16BECC701	Professional Ethics, Principles Of Management And Entrepreneurship Development	<ol style="list-style-type: none"> <li>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</li> <li>2. To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour.</li> <li>3. To give an understanding of Intellectual Property Rights, Patents.</li> <li>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</li> <li>5. To develop good ideas of the legal and practical aspects of their profession</li> <li>6. Gathered ideas of the legal and practical aspects of their profession</li> </ol>
28.	16BECE702	Design Of Steel Structures	<ol style="list-style-type: none"> <li>1. Apply the IS code of practice for the design of steel structural elements.</li> <li>2. Design compression and tension members using simple and built-up sections.</li> <li>3. Calculate forces on the various members of the truss and design them.</li> <li>4. Analyze the behaviour of bolted connections and design them.</li> <li>5. Design welded connections for both axial and eccentric forces.</li> <li>6. Design components of truss, loads on trusses, analysis and design of purlins and truss members.</li> </ol>

29.	16BECE703	Traffic Engineering And Management	<ol style="list-style-type: none"> <li>1. Carry out traffic studies.</li> <li>2. Design intersections.</li> <li>3. Implement traffic system management.</li> <li>4. Be aware of traffic flow theory.</li> <li>5. Enhance safety in all design aspects.</li> <li>7. The skills of traffic control.</li> </ol>
30.	16BECE7E07	Remote Sensing Techniques And Applications	<ol style="list-style-type: none"> <li>1. Develop fundamental understanding of the GIS and remote sensing technologies.</li> <li>2. Understand the basic principles underlying the GIS based management of water resources and environment.</li> <li>3. Apply the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.</li> <li>4. Understand the types of remotely sensed images and data available for water resource applications.</li> <li>5. Develop a project report and can develop Water Resource Information Systems (WRIS) for regional and basin scale.</li> <li>6. Understand the basic principles underlying the GIS/model-based management of water resources and environment.</li> </ol>
31.	16BEECOE02	Consumer Electronics	<ol style="list-style-type: none"> <li>1. Understand working of various type of loud speakers</li> <li>2. Acquire knowledge on various types of picture tubes</li> <li>3. Demonstrate the working of various optical recording systems</li> <li>4. Distinguish various standards for color TV system</li> <li>5. Acquire knowledge on various telecommunication networks</li> <li>6. Demonstrate the working of various home appliances</li> </ol>
32.	16BEME0E02	Industrial Safety And Environment	<ol style="list-style-type: none"> <li>1. Recognize and evaluate occupational safety and health hazards in the workplace.</li> <li>2. Determine appropriate hazard controls following the hierarchy of controls.</li> <li>3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.</li> <li>4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.</li> <li>5. Understand the concept of Industrial Safety &amp; provide useful practical knowledge for workplace safety.</li> <li>6. Prevent or mitigate harm or damage to people, property, or the environment.</li> </ol>
33.	16BECE791	Project Work-Phase I	<ol style="list-style-type: none"> <li>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.</li> <li>2. Each student shall finally produce a comprehensive report covering background information, literature</li> </ol>

			<p>Survey, problem statement, Project work details and conclusions.</p> <ol style="list-style-type: none"> <li>3. This experience of project work shall help the student in expanding his / her knowledge base</li> <li>4. Will provide opportunity to utilise the creative ability and inference capability.</li> <li>5. Students will gain the presentation skills.</li> <li>7. To explain his/her project to the external examiner and can publish the projects in a reputed journal.</li> </ol>
34.	18BECE401	Introduction To Mechanical Engineering	<ol style="list-style-type: none"> <li>1. To impart the basic knowledge of various basic fields of mechanical engineering.</li> <li>2. Gain the basic manufacturing and machining processes.</li> <li>3. Able to know about basic machining process.</li> <li>4. Study about the operations of power plants.</li> <li>5. Know about the automobile engineering.</li> <li>6. The principles of refrigeration and air- conditioning</li> </ol>
35.	18BECE402	Engineering Geology	<ol style="list-style-type: none"> <li>1. Site characterization and how to collect, analyse, and report geologic data using standards in engineering practice</li> <li>2. The fundamentals of the engineering properties of Earth materials and fluids.</li> <li>3. Rock mass characterization and the mechanics of planar rock slides and topples.</li> <li>4. Soil characterization and the Unified Soil Classification System.</li> <li>5. The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability.</li> <li>6. Students are able to identify the different types of formation of earth.</li> </ol>
36.	18BECE403	Disaster Preparedness & Planning Management	<ol style="list-style-type: none"> <li>1. The application of Disaster Concepts to Management</li> <li>2. Analyzing Relationship between Development and Disasters.</li> <li>3. Ability to understand Categories of Disasters</li> <li>4. Realization of the responsibilities to society</li> <li>5. The Challenges posed by Disasters</li> <li>6. Understand the impacts of Disasters Key Skills.</li> </ol>
37.	18BECE404	Introduction To Solid Mechanics	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>4. Calculate the deflection at any point on a beam</li> </ol>

			<p>subjected to a combination of loads.</p> <ol style="list-style-type: none"> <li>Solve for stresses and deflections of beams under unsymmetrical loading; apply various failure criteria for general stress states at points.</li> <li>Solve torsion problems in bars and thin walled members.</li> </ol>
38.	18BECE441	Instrumentation & Sensor Technologies For Civil Engineering Applications	<ol style="list-style-type: none"> <li>To analyze the errors during measurements.</li> <li>To specify the requirements in the calibration of sensors and instruments.</li> <li>To describe the noise added during measurements and transmission.</li> <li>To describe the measurement of electrical variables.</li> <li>To describe the requirements during the transmission of measured signals.</li> <li>To construct Instrumentation/Computer Networks.</li> </ol>
39.	18BECE442	Introduction To Fluid Mechanics	<ol style="list-style-type: none"> <li>Understand the broad principles of fluid statics, kinematics and dynamics.</li> <li>Understand definitions of the basic terms used in fluid mechanics.</li> <li>Understand classifications of fluid flow.</li> <li>Be able to apply the continuity, momentum and energy principles.</li> <li>Be able to apply dimensional analysis.</li> <li>Understand the open channel flow, jets, turbines and pumps, dams and spillways, culverts, river.</li> </ol>
40.	18BECE443	Surveying & Geomatics	<ol style="list-style-type: none"> <li>Students will gain basic knowledge of surveying and unit conversions and its principle.</li> <li>Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities</li> <li>Translate the knowledge gained for the implementation of Civil infrastructure facilities</li> <li>Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetric and Remote Sensing.</li> <li>Able to measure horizontal, vertical, and zenith angles with a transit, theodolite, total station or survey grade GNSS instruments</li> <li>Able to identify and calculate the errors in measurements</li> </ol>
41.	18BECE411	Materials, Testing & Evaluation	<ol style="list-style-type: none"> <li>Calibrate electronic sensors.</li> <li>Operate a data acquisition system.</li> <li>Operate various types of testing machines.</li> <li>Configure a testing machine to measure tension or compression behaviour.</li> <li>Compute engineering values (e.g. stress or strain) from laboratory measures.</li> <li>Analyse a stress versus strain curve for modulus, yield strength and other related attributes.</li> </ol>
42.	18BECE451	Civil Engineering–	<ol style="list-style-type: none"> <li>The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.</li> </ol>

		Societal & Global Impact	<ol style="list-style-type: none"> <li>2. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future</li> <li>3. The Sustainability of the Environment, including its Aesthetics,</li> <li>4. The potentials of Civil Engineering for Employment creation and its Contribution to the GDP</li> <li>5. The Built Environment and factors impacting the Quality of Life</li> <li>6. The precautions to be taken to ensure that the above-mentioned impacts are not adverse but beneficial.</li> </ol>
43.	17BECE601	Structural Analysis II	<ol style="list-style-type: none"> <li>1. Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames</li> <li>2. Apply the methods of indeterminate truss analysis.</li> <li>3. Demonstrate the behaviour of arches and their methods of analysis.</li> <li>4. Analyse cable suspension bridges.</li> <li>5. Analyse multistorey frames subjected to gravity loads and lateral loads.</li> <li>6. Analyse multi storey frames subjected to gravity loads and lateral loads</li> </ol>
44.	17BECE602	Design Of RC Structures II	<ol style="list-style-type: none"> <li>1. Apply the concepts of liquid retaining structures.</li> <li>2. Design material storage structures using various theories.</li> <li>3. Apply the concepts of environmental and transportation structures.</li> <li>4. Demonstrate the detailing of reinforcement.</li> <li>5. Draw the various RCC structures.</li> <li>6. Design of material storage structures.</li> </ol>
45.	17BECE603	Environmental Engineering Ii	<ol style="list-style-type: none"> <li>1. Determine the sewage characteristics and design various sewage treatment plants.</li> <li>2. Analyse the status of surface water and ground water quality and the remediation technologies.</li> <li>3. Carry out municipal water and wastewater treatment system design and operation.</li> <li>4. Manage hazardous wastes, risk assessment and treatment technologies apply environmental treatment technologies and design process.</li> <li>5. study the information about air pollution and its effects.</li> <li>6. Gain the information about various sewage treatment processes</li> </ol>
46.	17BECE604	Design Of Steel Structures	<ol style="list-style-type: none"> <li>1. Apply the IS code of practice for the design of steel structural elements.</li> <li>2. Design compression and tension members using simple and built-up sections.</li> <li>3. Calculate forces on the various members of the truss and design them.</li> <li>4. Analyse the behaviour of bolted connections and design them.</li> <li>5. Design welded connections for both axial and eccentric forces.</li> </ol>

			6. Design components of truss, loads on trusses, analysis and design of purlins and truss members.
47.	15BECEE008	Ground Improvement Techniques	<ol style="list-style-type: none"> <li>1. Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area.</li> <li>2. Capable of providing alternate methods to improve its character suitable to the project, so that the structures built will be stable and serve.</li> <li>3. Describe the dewatering systems for different soil conditions and their effect.</li> <li>4. Express the working principles of different compaction methods on improving weak deposits.</li> <li>5. Express the design of geo textiles reinforcements for ground improvement.</li> <li>6. Express the soil stabilization methods for the problematic soils.</li> </ol>
48.	15BECEE012	Repair And Rehabilitation Of Structures	<ol style="list-style-type: none"> <li>1. Students must gain knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.</li> <li>2. Assessment of distressed structures, repairing of structures and demolition procedures.</li> <li>3. Available techniques and their application for strengthening or upgrading existing structural system</li> <li>4. Conducting field monitoring and non-destructive evaluation of concrete structures.</li> <li>5. Knowledge on various Non-destructive testing.</li> <li>6. Different materials used for maintenance of structures.</li> </ol>
49.	17BECE611	Concrete And Highway Laboratory	<ol style="list-style-type: none"> <li>1. Determine the strength of coarse aggregates.</li> <li>2. Find the compressive strength of concrete cubes and bricks.</li> <li>3. Determine the physical properties of given coarse aggregates, fine aggregates and cement samples.</li> <li>4. Characterize the aggregate used for road construction</li> <li>5. Characterize the bitumen used for road construction.</li> <li>6. Know the characteristics, properties and testing procedures of bitumen.</li> </ol>
50.	17BECE612	Environmental Engineering Laboratory	<ol style="list-style-type: none"> <li>1. Quantify the pollutant concentration in water, wastewater and ambient air.</li> <li>2. Recommend the degree of treatment required for the water and wastewater.</li> <li>3. Analyse the survival conditions for the microorganism and its growth rate.</li> <li>4. Quantify the water and wastewater pollutant</li> <li>5. Measure the concentration of air pollutants</li> <li>6. Analyse the characteristics of water</li> </ol>
51	17BECE651	Irrigation And Environmental Engineering Drawing	<ol style="list-style-type: none"> <li>1. Apply the software skills in the design of infrastructure.</li> <li>2. Apply computing techniques to transportation engineering.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Apply computing skills to water resources and environmental engineering.</li> <li>4. Apply computing skills to geotechnical engineering.</li> <li>5. Learn the software developing skills for structural design.</li> <li>6. Understand the computing techniques in the field of transportation.</li> </ol>
52.	16BECE801	Estimation, Quantity Surveying and Valuation	<ol style="list-style-type: none"> <li>1. Apply different types of estimates in different situations.</li> <li>2. Carry out analysis of rates and bill preparation at different locations.</li> <li>3. Demonstrate the concepts of specification writing.</li> <li>4. Carry out valuation of assets.</li> <li>5. The rate analysis and bill preparations</li> <li>6. The types of estimates under different conditions</li> </ol>
53.	16BEME0E02	Construction Resource Planning And Management	<ol style="list-style-type: none"> <li>1. Recognize and evaluate occupational safety and health hazards in the workplace.</li> <li>2. Determine appropriate hazard controls following the hierarchy of controls.</li> <li>3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.</li> <li>4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.</li> <li>5. Understand the concept of Industrial Safety &amp; provide useful practical knowledge for workplace safety.</li> <li>6. Prevent or mitigate harm or damage to people, property, or the environment.</li> </ol>
54.	16BECE891	Project Work-Phase II & Viva Voce	<ol style="list-style-type: none"> <li>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.</li> <li>2. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.</li> <li>3. This experience of project work shall help the student in expanding his / her knowledge base.</li> <li>4. Will provide opportunity to utilise the creative ability and inference capability.</li> <li>5. Students will gain the presentation skills.</li> <li>6. To explain his/her project to the external examiner and can publish the projects in a reputed journal.</li> </ol>

Name of the Department: **Computer Science Engineering**

**Course:** B.E. Computer Science

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BECS101	Mathematics I (Calculus and Linear Algebra for Computer Science Engineers)	The students will learn: <ol style="list-style-type: none"><li>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.</li><li>2. Fluency in integration using standard methods, including the ability to find an appropriate Method for a given integral.</li><li>3. The essential tools of matrices and linear algebra including linear transformations, Eigenvalues and diagonalization.</li><li>4. To apply differential and integral calculus to notions of curvature and to improper integral and proper integrals.</li><li>5. To solve the system of linear algebraic equations.</li><li>6. To analyze and evaluate the basic concepts of mathematics like matrix operation, vector spaces and calculus.</li></ol>
2.	19BECS102	English	Students undergoing this course will be able to <ol style="list-style-type: none"><li>1. Describe English language for communication: verbal &amp; non –verbal.</li><li>2. Express comprehension and acquisition of speaking &amp; writing ability.</li><li>3. Improve the student confidence in using English language in real life situations.</li><li>4. Develop word power: lexical, grammatical and communication competence.</li><li>5. To prepare the students to write business letters and other forms of technical writing.</li><li>6. Demonstrate the students to prepare for oral communication in formal contexts.</li></ol>
3.	19BECS141	Semi- Conductor Physics	Upon completion of this course, the students will be able to <ol style="list-style-type: none"><li>1. Develop the idea of quantum mechanics through applications.</li><li>2. Apply the concepts of quantum theory for various methodologies.</li><li>3. Explain the basic ideas of classical electron theory and energy band structures.</li><li>4. Illustrate the basics of semiconductor physics and its applications in various electronic devices.</li><li>5. Identify the basic properties and functioning of optical materials for optoelectronics.</li><li>6. Summarize the features of low dimensional materials for engineering applications.</li></ol>

4.	19BECS142	Problem Solving Through Programming (With C)	<p>The course will enable the students</p> <ol style="list-style-type: none"> <li>1. To formulate simple algorithms for arithmetic and logical problems</li> <li>2. To translate the algorithms to programs (in C language).</li> <li>3. To test and execute the programs and correct syntax and logical errors.</li> <li>4. To implement conditional branching, iteration and recursion.</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs.</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration</li> </ol>
5.	19BECS201	Probability And Statistics	<p>The students will learn:</p> <ol style="list-style-type: none"> <li>1. The ideas of probability, random variables and various discrete and continuous probability distributions and their properties.</li> <li>2. The basic ideas of statistics including measures of central tendency, correlation and regression.</li> <li>3. The statistical methods of studying data samples.</li> <li>4. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.</li> <li>5. Understand the concept of the sampling distribution of a statistic, and in particular describe the behavior of the sample mean and hypothesis testing.</li> <li>6. To apply problem solving techniques to solve real world events.</li> </ol>
6.	19BECS241	CHEMISTRY-I	<ol style="list-style-type: none"> <li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li> <li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li> <li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li> <li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li> <li>5. List major chemical reactions that are used in the synthesis of molecules.</li> <li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li> </ol>

7.	19BECS242	Basic Electrical Engineering	<ol style="list-style-type: none"> <li>1. To understand and analyse basic electric and magnetic circuits.</li> <li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li> <li>3. Attributing the electrical machines and transformer</li> <li>4. Evaluate the various digital circuits in real time applications.</li> <li>5. Analysis various semiconductor devices in real time applications.</li> <li>6. Reproduce the Measuring Instruments and Electrical Installation.</li> </ol>
8.	19BECS211	Workshop / Manufacturing Practices Laboratory	<ol style="list-style-type: none"> <li>1. The students will gain knowledge of the different manufacturing processes.</li> <li>2. To fabricate components using different materials.</li> <li>3. Students will be able to fabricate components with their own hands.</li> <li>4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances</li> <li>5. By assembling different components with different processes.</li> <li>6. They will be able to produce small devices of their interest.</li> </ol>
9.	19BECS212	Engineering Graphics And Design	<ol style="list-style-type: none"> <li>1. Introduction to engineering design and its place in society</li> <li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li> <li>3. Exposure to engineering communication effectively.</li> <li>4. Exposure to 3D free hand sketching.</li> <li>5. Acquired the knowledge of projections of points, lines and plane surfaces.</li> <li>6. Understand the basic concept of projection of solids.</li> </ol>
10.	18BECS301	Mathematics-III (Differential Calculus)	<ol style="list-style-type: none"> <li>1. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.</li> <li>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.</li> <li>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.</li> <li>4. To solve first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.</li> <li>5. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications to have basic</li> </ol>

			<p>knowledge and understanding in one field of materials, differential calculus.</p> <p>6. To able to evaluate integrals of rational functions by partial fractions.</p>
11.	18BECS302	Environmental Studies	<ol style="list-style-type: none"> <li>1. Prepare them to go eco-friendly and help preserving the nature and environment.</li> <li>2. Educate the means in preserving the environment.</li> <li>3. Understand the various types of pollution and environmental status.</li> <li>4. Enhance the fundamental knowledge on human welfare measures and sustainable and unsustainable development.</li> <li>5. Get an insight on various Social issues and how it effects the environment</li> <li>6. Demonstrate a general understanding of the breadth and interdisciplinary nature of environmental issues.</li> </ol>
12.	18BECS311	IT Workshop (SCILAB/MATLAB)	<ol style="list-style-type: none"> <li>1. Understand the main features of the SCILAB program development environment to enable their usage in higher learning.</li> <li>2. Implement simple mathematical functions/equations in numerical computing environment such as SCILAB.</li> <li>3. Interpret and visualize simple mathematical functions and operations thereon using plots/display.</li> <li>4. Analyse the program for correctness and determine/estimate/predict the output and verify it under simulation environment using SCILAB tools.</li> <li>5. Perform simulation/implementation of various applications.</li> <li>6. Good understanding of Linear algebra and Signal processing concepts.</li> </ol>
13.	18BECS341	Analog Electronic Circuits	<ol style="list-style-type: none"> <li>1. Understand the characteristics of electronic devices including diodes, BJT and MOSFET.</li> <li>2. Design and analyse various rectifier and amplifier circuits.</li> <li>3. Design sinusoidal and non-sinusoidal oscillators.</li> <li>4. Understand the functioning of OP-AMP and design OP-AMP based circuits.</li> <li>5. Understand differential, multi-stage and operational amplifiers.</li> <li>6. Design and analyse Linear and Nonlinear applications of op-amp.</li> </ol>
14.	18BECS342	Data Structure & Algorithms	<ol style="list-style-type: none"> <li>1. To analyze the algorithms to determine the time and computation complexity and justify the correctness.</li> <li>2. To implement Linear Search and Binary Search.</li> <li>3. To construct the Stacks, Queues and linked list student, perform relevant operations and to</li> </ol>

			<p>analyze and determine the time and computation complexity.</p> <ol style="list-style-type: none"> <li>To write algorithms for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in terms of Space and Time complexity.</li> <li>To implement Graph search and traversal algorithms and determine the time and space complexities</li> <li>Students will be able to implement Linear and Non-Linear data structures.</li> </ol>
15.	18BECS343	Digital Electronics	<ol style="list-style-type: none"> <li>Understand the characteristics and operations of logic functions and logic gates.</li> <li>Design and implement Combinational and Sequential logic circuits.</li> <li>Understand the process of Analog to Digital conversion and Digital to Analog conversion.</li> <li>Understand the functions of semiconductors and memories.</li> <li>Use PLDs to implement the given logical problem.</li> <li>Apply the design procedures to design basic sequential circuits.</li> </ol>
16.	18BECS351	PC Hardware Assembly And Troubleshooting	<ol style="list-style-type: none"> <li>Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment.</li> <li>Communicate effectively and present technical information in oral and written reports.</li> <li>Apply information technology to a variety of systems including financial, production and manufacturing systems.</li> <li>Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas in the IT sector.</li> <li>Describe and analyse current and relevant advances in computer hardware and software.</li> <li>Analyse system requirements for a variety of computer applications.</li> </ol>
17.	17BECS501	Operating Systems	<ol style="list-style-type: none"> <li>Understand device and I/O management functions in operating systems as part of a uniform device abstraction.</li> <li>Have an understanding of disk organization and file system structure.</li> <li>Be able to give the rationale for virtual memory abstractions in operating systems.</li> <li>Understand the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.</li> <li>Understand the main mechanisms used for inter-process communication.</li> <li>Understand the main problems related to concurrency and the different synchronization mechanisms available.</li> </ol>

18.	17BECS502	Computer Networks	<ol style="list-style-type: none"> <li>1. To understand the division of network functionalities into layers</li> <li>2. To understand the concepts of data communications</li> <li>3. To understand the working of router</li> <li>4. Able to identify the ports used for transferring and receiving data</li> <li>5. Able to identify the flow control mechanism to be adopted in transport layer.</li> <li>6. Able to understand the functions of application layer</li> </ol>
19.	17BECS503	Software Engineering	<ol style="list-style-type: none"> <li>1. Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.</li> <li>2. Employ group working skills including general organization, planning and time management and inter-group negotiation.</li> <li>3. Translate a requirements specification into an implementable design, following a structured and organised process.</li> <li>4. Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.</li> <li>5. Evaluate the quality of the requirements, analysis and design work done during the module.</li> <li>6. Able to back track effectively to improve the current functionalities using appropriate software measures.</li> </ol>
20.	17BECS5E01	Advanced Data Structures	<ol style="list-style-type: none"> <li>1. Solve problems using the procedural, functional and object-oriented programming paradigms.</li> <li>2. Relates all binary heap trees to form a large binomial queue for large data structures creation.</li> <li>3. Analyse how to balance a binary search tree using rotation methods and colour changing methods.</li> <li>4. Solve problems using graph algorithms, including single-source and all-pairs shortest paths, and minimum spanning tree algorithms.</li> <li>5. Analyse the time and space complexity of advanced data structures and their supported operations.</li> <li>6. Compare the time and space trade-off of different advanced data structures and their common operations.</li> </ol>
21.	17BECS5E07	Servlets And JSP	<ol style="list-style-type: none"> <li>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.</li> <li>2. Apply Model-View-Controller (MVC) architecture to projects in EE environments.</li> <li>3. Create servlet filters and listeners.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Understand and manage HTTP sessions in a web application.</li> <li>5. Create easy-to-maintain JSP pages using Expression Language and the JSP Standard Tag Library (JSTL).</li> <li>6. Analyse, design, develop and deploy web applications with Java EE 6 SDK and the application server Oracle WebLogic Server.</li> </ol>
22.	17BECS511	Computer Networks Lab	<ol style="list-style-type: none"> <li>1. Understand fundamental underlying principles of computer networking.</li> <li>2. Understand details and functionality of layered network architecture.</li> <li>3. Apply mathematical foundations to solve computational problems in computer networking.</li> <li>4. Understands computer networking concepts and vocabulary.</li> <li>5. Understands the concept of protocols.</li> <li>6. Utilizing Network tools and simulator.</li> </ol>
23.	17BECS512	Operating Systems Lab	<ol style="list-style-type: none"> <li>1. Identify the services provided by operating system.</li> <li>2. Able to write programs on Shell Script.</li> <li>3. Understand the internal structure of an operating system and be able to write programs.</li> <li>4. Understand and solve problems involving key concepts and theories in operating systems.</li> <li>5. Able to implement scheduling algorithms.</li> <li>6. Able to understand the memory management concepts</li> </ol>
24.	17BECS513	Case Tools Lab	<ol style="list-style-type: none"> <li>1. The students understand the process to be followed in the software development lifecycle.</li> <li>2. Find practical solutions to the problems.</li> <li>3. Solve specific problems alone or in teams.</li> <li>4. Manage a project from beginning to end.</li> <li>5. Work independently as well as in teams.</li> <li>6. Define, formulate and analyse a problem.</li> </ol>
25.	16BECC701	Professional Ethics, Principles Of Management And Entrepreneurship Development	<ol style="list-style-type: none"> <li>1. To Discuss and communicate the management evolution and how it will affect future managers.</li> <li>2. Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.</li> <li>3. To Practice the process of management's four functions: planning, organizing, leading, and controlling.</li> <li>4. To evaluate leadership styles to anticipate the consequences of each leadership style.</li> <li>5. To understand the nature of professional responsibility and be able to identify the ethical elements in decisions.</li> </ol>

			6. To develop critical thinking skills and professional judgment and understand practical difficulties of bringing about change.
26.	16BECS702	Internet And Web Technology	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the components of a computer information networked system,</li> <li>2. To learn about application and software, communication protocols, and networking hardware and software.</li> <li>3. Create, install and update sophisticated web sites.</li> <li>4. Install and manage server software and other server-side tools.</li> <li>5. Demonstrate critical thinking in the understanding, evaluation and application of technology solutions to a variety of real-life situations.</li> <li>6. Articulate ethical and professional standards as they apply to the use of the computer systems and computer-based data.</li> </ol>
27.	16BECS7E04	Information Security	<ol style="list-style-type: none"> <li>1. Learn to select appropriate techniques to tackle and solve problems in the discipline of information security management;</li> <li>2. Learn the importance of security and its management for any modern organization</li> <li>3. Learn how an information security management system should be planned, documented, implemented and improved, according to the BSI standard on information security management.</li> <li>4. To master information security governance, and related legal and regulatory issues.</li> <li>5. To be familiar with how threats to an organization are discovered, analysed, and dealt with.</li> <li>6. To be familiar with network security threats and countermeasures</li> </ol>
28.	16BESH0E06	Green Chemistry	<ol style="list-style-type: none"> <li>1. Outline the basic principles of green chemistry (K).</li> <li>2. Examine the different atom efficient process and synthesis elaborately (S)</li> <li>3. Apply the concepts combustion of green technology (S).</li> <li>4. Identify and apply the concepts of renewable energy(S).</li> <li>5. Apply the concepts of green catalysts in the synthesis (S).</li> <li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)</li> </ol>
29.	16BEECOE02	Consumer Electronics	<ol style="list-style-type: none"> <li>1. Gain knowledge about various speakers and microphone.</li> <li>2. Gain knowledge about the fundamental of television systems and standards.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Gain knowledge about the process of audio recording and reproduction.</li> <li>4. Gain knowledge about the various telephone networks.</li> <li>5. Maintain various Consumer Electronic Appliances.</li> <li>6. Maintain Audio Systems.</li> </ol>
30.	16BECS711	Web Technology Lab	<ol style="list-style-type: none"> <li>1. The students will be able to design Web pages using HTML/XML and style sheets.</li> <li>2. Able to use XML to store and forwarding data.</li> <li>3. Students will find the ease of implementation of a website and the role of servlets in creating the dynamic websites.</li> <li>4. The students will be able to write Client Server applications.</li> <li>5. The students will be able to create dynamic web pages using server-side scripting.</li> <li>6. Able to create a complete Web Application with all the required modules.</li> </ol>
31.	18BECS401	Discrete Mathematics	<ol style="list-style-type: none"> <li>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.</li> <li>2. To apply a given logic sentence and express it in terms of predicates, quantifiers, and logical connectives.</li> <li>3. To be exposed to the concepts and properties of algebraic structures such as groups, rings and fields.</li> <li>4. To Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.</li> <li>5. To develop the given problem as graph networks and solve with techniques of graph theory.</li> <li>6. To apply logical reasoning to solve a variety of problems.</li> </ol>
32.	18BECS402	Management 1 (Organizational Behavior)	<ol style="list-style-type: none"> <li>1. Understand and apply principles of organizational dynamics.</li> <li>2. Apply principles relating to systems, culture, structure and change the processes.</li> <li>3. Develop critical analytical skills that will help them diagnose situations pertaining to human behaviour.</li> <li>4. Generate effective solutions for the same.</li> <li>5. Understand performance behaviour at individual and group levels.</li> <li>6. Develop the ability to lead and motivate others to succeed.</li> </ol>
33.	18BECS441	Computer Organization & Architecture	<ol style="list-style-type: none"> <li>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.</li> <li>2. Write assembly language program for</li> </ol>

			<p>specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).</p> <ol style="list-style-type: none"> <li>Write a flow chart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.</li> <li>Design a memory module and analyse its operation by interfacing with the CPU.</li> <li>Apply design techniques to enhance performance using pipelining, parallelism and RISC methodology.</li> <li>Exemplify in a better way the I/O and memory organization.</li> </ol>
34.	18BECS442	Operating Systems	<ol style="list-style-type: none"> <li>Understand the different concepts and functions of Operating Systems.</li> <li>Design various Scheduling algorithms.</li> <li>Apply the principles of concurrency.</li> <li>Design deadlock, prevention and avoidance algorithms.</li> <li>Compare and contrast various memory management schemes.</li> <li>Design and Implement a prototype file system.</li> </ol>
35.	18BECS443	Design & analysis Of algorithms	<ol style="list-style-type: none"> <li>Analyze worst-case, average case and the best-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.</li> <li>Describe the greedy paradigm and explain when an algorithmic design situation calls for it and to develop the greedy algorithms.</li> <li>Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. To synthesize divide-and-conquer algorithms.</li> <li>Derive and solve recurrence relations</li> <li>Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming develop the dynamic programming algorithms, and analyse it to determine its computational complexity.</li> <li>To write the effective algorithms to solve engineering problems</li> </ol>
36.	18BECS451	Mobile Application Development	<ol style="list-style-type: none"> <li>Ability to install Android in Eclipse.</li> <li>Understanding of the Android environment to develop projects.</li> <li>Ability to develop simple Android projects.</li> <li>Understanding of the android widgets and inclusion of it in projects.</li> <li>Ability to create android application for playing audio and video files.</li> <li>Demonstrate their understanding of the fundamentals of Android operating systems</li> </ol>
37.	17BECS601	Compiler Design	<ol style="list-style-type: none"> <li>Build lexical analysers and use them in the construction of parsers.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Express the grammar of a programming language.</li> <li>3. Build syntax analysers and use them in the construction of parsers.</li> <li>4. Perform the operations of semantic analysis.</li> <li>5. Discuss the merits of different optimization schemes.</li> <li>6. Able to design and Implement a simple compiler.</li> </ol>
38.	17BECS602B	Mobile And Pervasive Computing	<ol style="list-style-type: none"> <li>1. Outline the basic problems, performance requirements of pervasive computing applications.</li> <li>2. Understand the trends of pervasive computing and its impacts on future computing applications and society.</li> <li>3. Analyze and compare the performance of different data dissemination techniques.</li> <li>4. Understand the algorithms for mobile real-time applications.</li> <li>5. Analyze the performance of different sensor data management and routing algorithms for sensor networks.</li> <li>6. Develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.</li> </ol>
39.	17BECS603	Artificial Intelligence	<ol style="list-style-type: none"> <li>1. Understand the history, development and various applications of artificial intelligence.</li> <li>2. Familiarize with propositional and predicate logic and their roles in logic programming.</li> <li>3. Understand the programming language Prolog and write programs in declarative programming style.</li> <li>4. Learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems.</li> <li>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).</li> <li>6. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.</li> </ol>
40.	17BECS604B	Object Oriented Analysis And Design	<ol style="list-style-type: none"> <li>1. Express software design with UML diagrams.</li> <li>2. Design software applications using OO concepts.</li> <li>3. Identify various scenarios based on software requirements.</li> <li>4. Transform UML based software design into pattern-based design using design patterns.</li> <li>5. Understand the various testing methodologies for OO software.</li> <li>6. To understand the use-case diagrams.</li> </ol>
41.	17BECS6E02	Network Routing Algorithms	<ol style="list-style-type: none"> <li>1. Understand layered architecture and its significance.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Learn network layer and various routing techniques available.</li> <li>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.</li> <li>4. Design a new algorithm or modify an existing algorithm to satisfy the evolving demands in the network and by the user applications.</li> <li>5. Analyse and implement a proper routing algorithm for defined networks.</li> <li>6. Learn advanced networking concepts with modern network conditions.</li> </ol>
42.	17BECS6E07	Software Project Management	<ol style="list-style-type: none"> <li>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.</li> <li>2. Identify and analyze software project activities using contemporary work breakdown techniques.</li> <li>3. Identify and apply selected techniques for estimating the effort and duration of project activities.</li> <li>4. Construct a schedule of project activities using contemporary planning techniques.</li> <li>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.</li> <li>6. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.</li> </ol>
43.	16BECS801	Software Testing	<ol style="list-style-type: none"> <li>1. Understand complete software testing life cycle.</li> <li>2. Demonstrate understanding of various terms and technologies used in testing domain.</li> <li>3. Demonstrate understanding of usage of testing framework, process and test management.</li> <li>4. Demonstrate understanding of generating test plan and designing test cases</li> <li>5. Demonstrate understanding of test management process.</li> <li>6. Given a business scenario, identify and write the test plan, design test cases, document test cases using an open source test management tool.</li> </ol>
44.	16BECS8E02	E-Commerce	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the foundations and importance of E-commerce.</li> <li>2. Describe the infrastructure required for E-commerce.</li> </ol>

			<ol style="list-style-type: none"><li>3. Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other.</li><li>4. Analyze the online threats and strategies for marketing.</li><li>5. Discuss legal issues and privacy in E-Commerce.</li><li>6. To Know and manage E-Business</li></ol>
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Name of the Department: **Electronics & Communication Engineering**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BEEC101	Mathematics –I	<ol style="list-style-type: none"><li>1. Evaluate the limits and continuity of various functions.</li><li>2. Apply various techniques to solve Partial Differential Equations</li><li>3. Find an appropriate method to solve the given integral.</li><li>4. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.</li><li>5. Solve simple standard examples using the ideas of differential equations.</li><li>6. Apply the knowledge acquired to solve various engineering problems.</li></ol>
2.	19BEEC102	English	<p>Students undergoing this course will be able to</p> <ol style="list-style-type: none"><li>1. Describe English language for communication: verbal &amp; non –verbal.</li><li>2. Express comprehension and acquisition of speaking &amp; writing ability.</li><li>3. Improve the student confidence in using English language in real life situations.</li><li>4. Develop word power: lexical, grammatical and communication competence.</li><li>5. To prepare the students to write business letters and other forms of technical writing.</li><li>6. Demonstrate the students to prepare for oral communication in formal contexts.</li></ol>
3.	19BEEC141	Semi- Conductor Physics	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"><li>1. Develop the idea of quantum mechanics through applications.</li><li>2. Apply the concepts of quantum theory for various methodologies.</li><li>3. Explain the basic ideas of classical electron theory and energy band structures.</li><li>4. Illustrate the basics of semiconductor physics and its applications in various electronic devices.</li><li>5. Identify the basic properties and functioning of optical materials for optoelectronics.</li><li>6. Summarize the features of low dimensional materials for engineering applications.</li></ol>
4.	19BEEC142	Programming For Problem Solving	<p>The course will enable the students</p> <ol style="list-style-type: none"><li>1. To formulate simple algorithms for arithmetic and logical problems</li><li>2. To translate the algorithms to programs (in C language)</li><li>3. To test and execute the programs and correct syntax and logical errors</li></ol>

			<ol style="list-style-type: none"> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
5.	19BEEEC155	Yoga	<ol style="list-style-type: none"> <li>1. To enable the student to have physical health and mental health.</li> <li>2. Demonstrate the ability to create and present various yoga activities.</li> <li>3. Demonstrate basic skills associated with yoga activities including strength and flexibility, balance and coordination</li> <li>4. Asanas enhance muscle strength, coordination, flexibility, agility and range of motion.</li> <li>5. Yoga improves posture, increases the intake of oxygen and enhances the functioning of all body systems like respiratory, digestive, endocrine, reproductive, excretory systems etc.</li> <li>6. Practicing Yoga ultimately leads towards long-term health and well-being.</li> </ol>
6.	19BEEEC201	Mathematics – II	<ol style="list-style-type: none"> <li>1. Apply advanced matrix knowledge to engineering problems.</li> <li>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.</li> <li>3. Find the Analytic functions using the Cauchy Riemann equations and discuss how geometric structures are changing under conformal mappings.</li> <li>4. Evaluate complex integrals using the Cauchy's integral formula and the Residue theorem.</li> <li>5. Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.</li> <li>6. Apply the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in Engineering fields.</li> </ol>

7.	19BEEC202	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> <li>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.</li> </ol>
8.	19BEEC241	CHEMISTRY-I	<ol style="list-style-type: none"> <li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li> <li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li> <li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li> <li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li> <li>5. List major chemical reactions that are used in the synthesis of molecules.</li> <li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li> </ol>
9.	19BEEC242	Basic Electrical Engineering	<ol style="list-style-type: none"> <li>1. understand and analyse basic electric and magnetic circuits.</li> <li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li> <li>3. Attributing the electrical machines and transformer.</li> <li>4. Evaluate the various circuits in real time applications.</li> <li>5. Analysis various semiconductor devices in real time applications.</li> </ol>

			<ol style="list-style-type: none"> <li>6. Reproduce the Measuring Instruments and Electrical Installation.</li> <li>7. understand and analyse basic electric and magnetic circuits.</li> </ol>
10.	19BEEC211	Workshop / Manufacturing Practices Laboratory	<ol style="list-style-type: none"> <li>1. The students will gain knowledge of the different manufacturing processes.</li> <li>2. To fabricate components using different materials.</li> <li>3. Students will be able to fabricate components with their own hands.</li> <li>4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances</li> <li>5. By assembling different components with different processes.</li> <li>6. They will be able to produce small devices of their interest</li> </ol>
11.	19BEEC212	Engineering Graphics And Design	<ol style="list-style-type: none"> <li>1. Introduction to engineering design and its place in society</li> <li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li> <li>3. Exposure to solid modelling ,computer-aided geometric design, creating working drawings and engineering communication</li> <li>4. Exposure to 3D free hand sketching.</li> <li>5. Acquired the knowledge of projections of points, lines and plane surfaces.</li> <li>6. Understand the basic concept of projection of solids.</li> </ol>
12.	18BEEC301	Linear Algebra And Partial Differential Equations	<ol style="list-style-type: none"> <li>7. Analysis of the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.</li> <li>8. Illustrate accurate and efficient use of advanced algebraic techniques.</li> <li>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.</li> <li>10. Gain the capability to solve various types of partial differential equations.</li> <li>11. Ability to clarify engineering problems using Fourier series.</li> <li>12. Able to apply the fundamental concepts in their respective engineering fields</li> </ol>
13.	18BEEC302	Electronic Devices	<ol style="list-style-type: none"> <li>1. Demonstrate the principle of semiconductor physics</li> <li>2. Understand and utilize the mathematical models of semiconductor</li> <li>3. Gain knowledge on construction and applications of Diodes</li> <li>4. Understand MOS transistors for circuits and systems</li> <li>5. Gain knowledge on Construction and working of Field effect Transistors.</li> </ol>

			6. List the steps involved in IC fabrication process
14.	18BEEEC303	Digital System Design	<ol style="list-style-type: none"> <li>1. Design and analyze combinational logic circuits</li> <li>2. Design &amp; analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder</li> <li>3. Design &amp; analyze synchronous sequential logic circuits</li> <li>4. Differentiate different logical families</li> <li>5. Gain knowledge about various memory devices and implement using PLDs</li> <li>6. Use HDL &amp; appropriate EDA tools for digital logic design and simulation</li> </ol>
15.	18BEEEC304	C++ & Data Structures	<ol style="list-style-type: none"> <li>1. Gain confidence to use a simple Java programming environment, compile programs and interpret compiler errors.</li> <li>2. Capable to understand and use the fundamental data types.</li> <li>3. Design classes and organize them into packages.</li> <li>4. Perceptive of the basic data structures.</li> <li>5. Understand the basic search and sort algorithms.</li> <li>6. Cultivate the knowledge to use a particular data structure and algorithm to solve a problem</li> </ol>
16.	18BEEEC305	Signals And Systems	<ol style="list-style-type: none"> <li>1. Analyze different types of signals</li> <li>2. Represent continuous and discrete systems in time and frequency domain using different transforms</li> <li>3. Apply Fourier series and Transforms on signals</li> <li>4. Investigate whether the system is stable</li> <li>5. Sample and reconstruct a signal</li> <li>6. Apply Laplace and Z Transforms on signals</li> </ol>
17.	18BEEEC306	Network Theory	<ol style="list-style-type: none"> <li>1. Understand basics electrical circuits with nodal and mesh analysis.</li> <li>2. Describe electrical network theorems.</li> <li>3. Apply Fourier series on networks</li> <li>4. Interpret Laplace Transform for steady state and transient analysis.</li> <li>5. Resolve different network functions.</li> <li>6. Understand the frequency domain techniques</li> </ol>
18.	18BEEEC311	C++ & Data Structures Laboratory	<ol style="list-style-type: none"> <li>1. Understand the principles of OOP;</li> <li>2. Ability to demonstrate good object-oriented programming skills in Java</li> <li>3. Understand the capabilities and limitations of Java</li> <li>4. Distinguish the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.</li> <li>5. Capability to analyze and differentiate</li> </ol>

			<p>different algorithms based on their time complexity.</p> <ol style="list-style-type: none"> <li>6. Demonstrate the linked implementation, and its uses both in linear and non-linear data structure.</li> </ol>
19.	18BEEEC312	Electronic Devices Laboratory	<ol style="list-style-type: none"> <li>1. Design various electronic circuits for various configurations and applications</li> <li>2. Design and simulate diverse circuits using simulation software</li> <li>3. Clear idea about the design of rectifiers.</li> <li>4. To divulge the basics of LED with three different wavelengths.</li> <li>5. To make the students familiar with construction series voltage regulator.</li> <li>6. To learn the photo-diode and phototransistor</li> </ol>
20.	18BEEEC313	Digital System Design Laboratory	<ol style="list-style-type: none"> <li>1. Design various combinational circuits for different application</li> <li>2. Implementation of combinational functions using LSI devices</li> <li>3. Construct counter circuits for different application</li> <li>4. Simulate a design using VHD/Verilog HDL</li> <li>5. Design a two-bit magnitude comparator.</li> <li>6. Design and simulate encoder and decoder circuits.</li> </ol>
21.	18BEEEC351	PCB Designing	<ol style="list-style-type: none"> <li>1. At the end of this course students will demonstrate the ability to simulate any circuit design using simulation software.</li> <li>2. Able to carry out any PCB design necessary for their graduation projects</li> <li>3. 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.</li> <li>4. Gain good knowledge about PCB design.</li> <li>5. Clear idea about automatic routing and manual routing.</li> <li>6. Understand the basics tools used in PCB.</li> </ol>
22.	17BEEEC501	Digital Signal Processing	<ol style="list-style-type: none"> <li>1. Apply DFT for the analysis of digital signals &amp; systems</li> <li>2. Design IIR and FIR filters</li> <li>3. Characterize finite Word length effect on filters</li> <li>4. Design the Multirate Filters.</li> <li>5. Apply Adaptive Filters to equalization.</li> <li>6. Apply direct form I and direct form II structures.</li> </ol>
23.	17BEEEC502	Digital Communication	<ol style="list-style-type: none"> <li>1. Design PCM systems.</li> <li>2. Design and implement base band transmission schemes.</li> <li>3. Design and implement band pass signaling schemes.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Analyze the spectral characteristics of band pass signaling schemes and their noise performance.</li> <li>5. Analyze the characteristics of CDMA.</li> <li>6. Familiarize with spread spectrum technique.</li> </ol>
24.	17BEEEC503	Antennas And Wave Propagation	<ol style="list-style-type: none"> <li>1. Explain the various types of antennas and wave propagation.</li> <li>2. Write about the radiation from a current element.</li> <li>3. Analyze the antenna arrays and special antennas with introduction into CAD modelling.</li> <li>4. Determinene impedance, gain and efficiency of different antennas</li> <li>5. Familiarize with basics of antenna measurement and radiation pattern.</li> <li>6. Analyze the structure and mechanism of ionospheric propagation.</li> </ol>
25.	17BEEEC504	Microprocessors And Microcontrollers	<ol style="list-style-type: none"> <li>1. Design and implement programs on 8086 microprocessors.</li> <li>2. Design and implement programs on 8051 microcontrollers.</li> <li>3. Design Memory Interfacing circuits using 8051.</li> <li>4. Gain knowledge on ARMv7 processor.</li> <li>5. Introduce the CPU timer's.</li> <li>6. To familiarize with Keyboard and stepper motor concepts.</li> </ol>
26.	17BEEEC511	Digital Signal Processing Laboratory	<ol style="list-style-type: none"> <li>1. Carry out simulation of DSP systems.</li> <li>2. Demonstrate the applications of FFT to DSP.</li> <li>3. Implement adaptive filters for various applications of DSP.</li> <li>4. Apply DFT for the analysis of digital signals &amp; systems</li> <li>5. Design IIR and FIR filters</li> <li>6. Characterize finite Word length effect on filters</li> </ol>
27.	17BEEEC512	Communication Systems Laboratory	<ol style="list-style-type: none"> <li>1. Distinguish between radiation patterns of various antennas.</li> <li>2. Demonstrate their knowledge in AM, FM transmission and reception.</li> <li>3. Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK.</li> <li>4. To divulge the basics of Delta modulation &amp; demodulation.</li> <li>5. To familiarize with the basics about Digital modulation &amp; demodulation.</li> <li>6. Analyze the fundamentals about AM receiver and FM Receiver.</li> </ol>
28.	17BEEEC513	Microprocessor And Microcontroller Laboratory	<ol style="list-style-type: none"> <li>1. Write ALP Programmes for fixed and Floating Point and Arithmetic.</li> <li>2. Interface different I/Os with processor.</li> <li>3. Execute Programs in 8051.</li> <li>4. Design Memory Interfacing circuits using</li> </ol>

			8051. 5. Gain knowledge on ARMv7 processor. 6. Introduce the CPU timer's.
29.	17BEEC551	Inplant Training	1. Gain knowledge on various tools used in industry 2. Recent technological advancement happening in current scenario 3. Capability to acquire and apply fundamental principles of engineering. 4. Become master in one's specialized technology 5. Become updated with all the latest changes in technological world 6. Knack to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills. 7. Ability to identify, formulate and model problems and find engineering solution based on a systems approach. 8. Capability and enthusiasm for self-improvement through continuous professional development and life-long learning
30.	16BEEC7E01	Sensors and Transducers	1. Understand basic concepts of various sensors and transducers. 2. Gain thorough knowledge in selection of suitable sensor based on requirement and application. 3. Familiarize with the basics of thermal sensors. 4. Understand the concepts of radiation sensors. 5. Analyze the concepts of medical diagnostic sensors. 6. Understand the basics of electroanalytical Sensors.
31.	16BEEC7E02	Computer Hardware And Interfacing	1. Knowledge about issues related to CPU and memory. 2. Understand the components of them other board. 3. Understand different storage media. 4. Knowledge about the features of different I/O peripherals devices and their interfaces. 5. Analyze the fundamentals of IDE drive standard and features. 6. Understand the Industry standard architecture.
32.	16BEEC7E03	High Speed Networks	1. Knowledge about ATM and Frame relay. 2. Knowledge on up-to-date survey of developments in High Speed Networks. 3. Enable the students to know techniques involved to support real-time traffic and congestion control. 4. Understand different levels of quality of service (Q.S) to different applications.

			<ol style="list-style-type: none"> <li>5. Understand the fundamentals of services-queuing discipline.</li> <li>6. Familiarize with the basics of protocol mechanisms and operations.</li> </ol>
33.	16BEEC7E04	Nano Electronics	<ol style="list-style-type: none"> <li>1. The students should be able to understand basic and advanced concepts of Nano electronic devices,</li> <li>2. Familiarize with sensors and transducers.</li> <li>3. Analyze the applications of sensors and transducers in nanotechnology.</li> <li>4. Understand the basics about electron wave transistor and electron spin transistor</li> <li>5. Analyze the application of Super conducting devices.</li> <li>6. Understand the fundamentals of Replacement Technologies</li> </ol>
34.	18BEEC401	Material Sciences	<ol style="list-style-type: none"> <li>1. Students accumulate the knowledge on the basics of magnetic materials and its applications.</li> <li>2. Gain knowledge on the concepts of superconductivity, devices and their applications.</li> <li>3. Clarity on the concepts of dielectric properties of materials and their applications in engineering field</li> <li>4. Understand the basics of crystals, their structures and different crystal growth techniques.</li> <li>5. Clear idea of ceramics, composites and nanomaterials.</li> <li>6. Ability to apply the knowledge gained to solve problems in solid state physics using appropriate mathematical formulae.</li> </ol>
35.	18BEEC402	Analog Circuits	<ol style="list-style-type: none"> <li>1. Understand the characteristics of transistors.</li> <li>2. Design and analyze high frequency models</li> <li>3. Design sinusoidal and non-sinusoidal oscillators</li> <li>4. Understand the functioning of OP-AMP and design OP-AMP based circuits.</li> <li>5. Design ADC and DAC</li> <li>6. Gain good knowledge in various classes of operation of amplifiers.</li> </ol>
36.	18BEEC403	Analog And Digital Communication	<ol style="list-style-type: none"> <li>1. Analyze and tabulate different analog modulation schemes in terms of efficiency and bandwidth.</li> <li>2. Analyze the behavior of a communication system in the presence of noise.</li> <li>3. Analyze different digital modulation schemes and compute the bit error performance</li> <li>4. Investigate pulsed modulation system and analyze the system performance.</li> <li>5. Gain knowledge on base band pulse transmission concepts.</li> </ol>

			6. Understand the pass band modulation concepts
37.	18BEEEC404	Microcontroller	<ol style="list-style-type: none"> <li>1. Design ALP for different applications for 8085</li> <li>2. Write ALP for different applications for 8086</li> <li>3. Gain knowledge on advanced processors and controllers</li> <li>4. Interface memory and I/O device with controllers</li> <li>5. Gain knowledge about architectures of RISC and ARM processors</li> <li>6. Distinguish between advanced processors</li> </ol>
38.	18BEEEC405	Economics For Engineers	<ol style="list-style-type: none"> <li>1. To apply the basics of economics</li> <li>2. Gain knowledge on Value Engineering</li> <li>3. To do cost analysis to engineering</li> <li>4. To do replacement and Maintenance analysis</li> <li>5. Gain knowledge on Depreciation methods</li> <li>6. To take economically sound decisions.</li> </ol>
39.	18BEEEC411	Microcontroller Laboratory	<ol style="list-style-type: none"> <li>1. Design applications like speed control using advanced controller.</li> <li>2. Write program on subroutine.</li> <li>3. Interface data converters with microcontrollers.</li> <li>4. Program advanced processors.</li> <li>5. Write program for design of simple system.</li> <li>6. Gain a good knowledge about interfacing with 8259 programmable interrupt controller.</li> </ol>
40.	18BEEEC412	Analog Circuits Laboratory	<ol style="list-style-type: none"> <li>1. Design various analogue circuits for various applications</li> <li>2. Design and simulate various circuits using simulation software</li> <li>3. Analyze the various linear application of op-amp</li> <li>4. Design filters to a given frequency</li> <li>5. Analyze multivibrator circuits using op-amp</li> <li>6. Construct an Instrumentation amplifier for a given gain.</li> </ol>
41.	18BEEEC413	Analog And Digital Communication Laboratory	<ol style="list-style-type: none"> <li>1. Understand the working of analog modulation techniques.</li> <li>2. Knowledge on Multiplexing mechanisms</li> <li>3. Construct Pulse modulation and demodulation circuits</li> <li>4. Simulate analog and digital modulation using simulation softwares.</li> <li>5. Gain knowledge about line coding &amp; decoding.</li> <li>6. Understand the delta modulation and demodulation</li> </ol>
42.	18BEEEC451	Constitution Of India	<ol style="list-style-type: none"> <li>1. Clarify on functions of the Central government.</li> <li>2. Define functions of the State government</li> <li>3. Explain the functions of Constitution</li> <li>4. Understand and abide the rules of the Indian constitution.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Identify and appreciate different culture among the people.</li> <li>6. Gain knowledge on Indian Society</li> </ol>
43.	17BEEEC601	Wireless Communication	<ol style="list-style-type: none"> <li>1. Gain adequate knowledge in the fundamentals of cellular radio concepts.</li> <li>2. Gain adequate knowledge in radio propagation models and modulation techniques.</li> <li>3. Provide ideas about analog modulation techniques used in mobile communication</li> <li>4. Provide the basics about digital modulation techniques used in mobile communication.</li> <li>5. Familiarize with the fundamentals of Multiple Access Techniques.</li> <li>6. Analyze the basics of diversity techniques.</li> </ol>
44.	17BEEEC602A	VLSI Design	<ol style="list-style-type: none"> <li>1. Explain the basic CMOS circuits and the CMOS process technology.</li> <li>2. Explain working of various complex gates and logic styles.</li> <li>3. Model the digital system using Hardware Description Language.</li> <li>4. Acquire the knowledge of procedural assignments conditional statements in VHDL.</li> <li>5. Understand the concept of mixed language programming</li> <li>6. Ability to write Verilog programmes for digital circuits</li> </ol>
45.	17BEEEC602B	Optical Communication	<ol style="list-style-type: none"> <li>1. Discuss the various optical fibre modes, configurations and various signal degradation factors associated with optical fibre.</li> <li>2. Explain the various optical sources and optical detectors and their use in the optical communication system.</li> <li>3. Analyze the digital transmission and its associated parameters on system performance.</li> <li>4. Learned the properties of the optical fibres and Connectors.</li> <li>5. Understand operation of lasers, LEDs, and detectors.</li> </ol>
46.	17BEEEC603A	Microwave Engineering	<ol style="list-style-type: none"> <li>1. Explain the active &amp; passive microwave devices &amp; components used in Microwave communication systems.</li> <li>2. Analyze the multi- port RF networks and RF transistor amplifiers.</li> <li>3. Generate Microwave signals and design microwave amplifiers.</li> <li>4. Measure and analyze Microwave signal and parameters.</li> <li>5. Familiarize with the basics of Principle of operation and application of VSWR meter.</li> <li>6. Understand the concepts of conventional vacuum Triodes.</li> </ol>

			8. Analyze the concepts of high power and Multistage Amplifiers
47.	17BEEEC603B	Embedded Systems	<ol style="list-style-type: none"> <li>1. Gain adequate knowledge about devices and buses used for embedded networking.</li> <li>2. Gain adequate knowledge about ARMv7 core and ARMCORTEXM4 architecture.</li> <li>3. Gain adequate knowledge about Floating Point Unit.</li> <li>4. Gain adequate knowledge about Motion Control. Gain knowledge on overview of Operating system</li> <li>5. Discuss about task Management</li> <li>6. Gain knowledge about semaphore management and message passing.</li> </ol>
48.	17BEEEC611A	VLSI Design Laboratory	<ol style="list-style-type: none"> <li>1. Write HDL code for basic as well as advanced digital integrated circuits.</li> <li>2. Import the logic modules into FPGA Boards.</li> <li>3. Model the digital system using Hardware Description Language.</li> <li>4. Acquire the knowledge of procedural assignments conditional statements in VHDL.</li> <li>5. Understand the concept of mixed language programming</li> <li>6. Ability to write verilog programmes for digital circuits</li> </ol>
49.	17BEEEC611B	Optical Communication Laboratory	<ol style="list-style-type: none"> <li>1. Analyze the performance of simple optical link.</li> <li>2. Analyse the mode characteristics of fibre.</li> <li>3. Explain the various optical sources and optical detectors and their use in the optical communication system.</li> <li>4. Analyze the digital transmission and its associated parameters on system performance.</li> <li>5. Learned the properties of the optical fibres and Connectors.</li> <li>6. Understand operation of lasers, LEDs, and detectors.</li> </ol>
50.	17BEEEC612A	Microwave Engineering Laboratory	<ol style="list-style-type: none"> <li>1. Analyse the radiation of pattern of antenna.</li> <li>2. Test various microwave components.</li> <li>3. Measure and analyze Microwave signal and parameters.</li> <li>4. Familiarize with the basics of Principle of operation and application of VSWR meter.</li> <li>5. Understand the concepts of conventional vacuum Triodes.</li> <li>6. Analyze the concepts of high power and Multistage Amplifiers</li> </ol>
51.	17BEEEC612B	Embedded System Design Laboratory	<ol style="list-style-type: none"> <li>1. Write programs in ARM and PIC microcontroller for a specific Application.</li> <li>2. Interface memory and Write programs related to memory operations</li> <li>3. Interface A/D and D/A convertors with ARM system.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Write programmes for interfacing keyboard, display, motor and sensor.</li> <li>5. Gain adequate knowledge about Floating Point Unit.</li> <li>6. Gain adequate knowledge about Motion Control. Gain knowledge on overview of Operating system</li> </ol>
52.	16BEEC8E01	Artificial Neural Networks	<ol style="list-style-type: none"> <li>1. Gain adequate knowledge about the various architectures of building an ANN and its applications.</li> <li>2. Gain adequate knowledge about advanced methods of representing information in ANN like self organizing networks, associative and competitive learning.</li> <li>3. Gain adequate knowledge about the architecture of Noncognition.</li> <li>4. Analyze an architecture of Noncognition.</li> <li>5. Design the self-organizing map-learning algorithm.</li> <li>6. Understand the basics of temporal networks for speech recognition,</li> </ol>
53.	16BEEC8E02	Virtual Instrumentation Using LabVIEW	<ol style="list-style-type: none"> <li>1. The students will be able to familiarize the basic sand need o</li> <li>2. The students will be able to learn LabVIEW software basics.</li> <li>3. To get better understanding of data acquisition techniques.</li> <li>4. The students can have an exposure to different interfacing techniques.</li> <li>5. The students can able to design some real time application using LabVIEW software.</li> <li>6. Design IIR and FIR filter in Lab view.</li> </ol>
54.	16BEEC8E03	FPGA Design	<ol style="list-style-type: none"> <li>1. Ability to understand FPGA lifecycle.</li> <li>2. Understand the concept of selecting a FPGA based on project specifications.</li> <li>3. Understand the floor planning, place and route optimization techniques.</li> <li>4. Knowledge on lower power reduction techniques to analyze and design FPGA.</li> <li>5. Understand the concepts of Power consumption reduction techniques.</li> <li>6. Analyze the basics about logical replications</li> </ol>
55.	16BEEC8E04	ASIC Design	<ol style="list-style-type: none"> <li>1. Understand basic knowledge of ASIC internals.</li> <li>2. Gain knowledge on types of ASIC.</li> <li>3. Gain knowledge about the tools used in ASIC design.</li> <li>4. Do Programming with ASIC</li> <li>5. Simulate and synthesize any circuit</li> <li>6. Perform testing of ASIC</li> </ol>

Name of the Department: **Electrical And Electronics Engineering**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BEEE101	Mathematics –I (Calculus and Differential Equations)	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
2.	19BEEE102	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.	19BEEE141	Waves, Optics And Introduction To Quantum Mechanics	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.
4.	19BEEE142	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

			<p>syntax and logical errors.</p> <ol style="list-style-type: none"> <li>To implement conditional branching, iteration and recursion.</li> <li>To decompose a problem into functions and synthesize a complete program using divide and conquer approach.</li> <li>To use arrays, pointers and structures to formulate algorithms and programs.</li> <li>To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.</li> <li>To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
5.	19BEEE201	Mathematics – II (Linear Algebra, Transform Calculus and Numerical Method)	<p>The students will learn:</p> <ol style="list-style-type: none"> <li>To solve the problems in engineering using Matrix algebra Techniques.</li> <li>Derive numerical methods for various mathematical operations and tasks such as interpolation, differentiation and integration.</li> <li>To analyze and evaluate the accuracy of solution for ordinary differential equations.</li> <li>To implement numerical methods to solve Partial differential equations.</li> <li>To solve problems using Laplace Transforms.</li> <li>To improve facility in numerical manipulation.</li> </ol>
6.	19BEEE241	Chemistry-I	<ol style="list-style-type: none"> <li>Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li> <li>Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li> <li>Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li> <li>Rationalise bulk properties and processes using thermodynamic considerations.</li> <li>List major chemical reactions that are used in the synthesis of molecules.</li> <li>Integrate the chemical principles in the projects undertaken in field of engineering and technology</li> </ol>
7.	19BEEE242	Basic Electrical Engineering	<ol style="list-style-type: none"> <li>Understand and analyse basic electric and magnetic circuits.</li> <li>Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li> <li>Attributing the electrical machines and transformer</li> <li>Evaluate the various circuits in real time applications.</li> <li>Analysis various semiconductor devices in real time applications.</li> <li>Reproduce the Measuring Instruments and Electrical Installation.</li> </ol>
8.	19BEEE211	Workshop / Manufacturing	<ol style="list-style-type: none"> <li>The students will gain knowledge of the different manufacturing processes.</li> <li>To fabricate components using different materials.</li> </ol>

		Practices Laboratory	<ol style="list-style-type: none"> <li>3. Students will be able to fabricate components with their own hands.</li> <li>4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances</li> <li>5. By assembling different components with different processes.</li> <li>6. They will be able to produce small devices of their interest.</li> </ol>
9.	19BEEE212	Engineering Graphics And Design	<ol style="list-style-type: none"> <li>1. Introduction to engineering design and its place in society</li> <li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li> <li>3. Exposure to engineering communication effectively.</li> <li>4. Exposure to 3D free hand sketching.</li> <li>5. Acquired the knowledge of projections of points, lines and plane surfaces.</li> <li>6. Understand the basic concept of projection of solids.</li> </ol>
10.	18BEEE301	Electrical Circuit Analysis	<ol style="list-style-type: none"> <li>1. Apply network theorems for the analysis of electrical circuits.</li> <li>2. Obtain the solution of first and Second order system</li> <li>3. Analyse the electrical circuits using Laplace Transforms.</li> <li>4. 4. Obtain the transient and steady-state response of electrical circuits.</li> <li>5. Analyse circuits in the sinusoidal steady-state (single-phase and three-phase).</li> <li>6. Analyse two port circuit behaviour.</li> </ol>
11.	18BEEE302	Analog Electronics	<ol style="list-style-type: none"> <li>1. Illustrate the structure, operation and characteristics of PN junction diode and its applications</li> <li>2. Understand the characteristics of transistors</li> <li>3. Design and analyse various rectifier and amplifier circuits</li> <li>4. Illustrate the concepts of various positive and negative feedback amplifiers and derive its parameters</li> <li>5. Design sinusoidal and non-sinusoidal oscillators.</li> <li>6. Understand the functioning of OP-AMP and design OP-AMP based circuits.</li> </ol>
12.	18BEEE301	Electrical Circuit Analysis	<ol style="list-style-type: none"> <li>1. Understand the concepts of magnetic fields</li> <li>2. Understand the concepts of magnetic circuits.</li> <li>3. Understand the operation of dc machines.</li> <li>4. Analyse the differences in operation of different dc machine configurations.</li> <li>5. Analyse the single-phase transformers circuits.</li> <li>6. Analyse the three phase transformers circuits.</li> </ol>
13.	18BEEE304	Electromagnetic Fields	<ol style="list-style-type: none"> <li>1. To understand the basic laws of electromagnetism.</li> <li>2. To obtain the electric and magnetic fields for simple configurations under static conditions.</li> </ol>

			<ol style="list-style-type: none"> <li>3. To understand the concept of Conductors, Dielectrics and Capacitance.</li> <li>4. To analyse time varying electric and magnetic fields.</li> <li>5. To understand Maxwell's equation in different forms and different media.</li> <li>6. To understand the propagation of EM waves.</li> </ol>
14.	18BEEE305	Engineering Mechanics	<ol style="list-style-type: none"> <li>1. Draw free body diagrams and determine the resultant of system of forces.</li> <li>2. Determine the reactions when forces are acting on rigid bodies.</li> <li>3. Determine the centroid and second moment of area of sections.</li> <li>4. Analyze statically determinate planar frames.</li> <li>5. Analyze the motion and determine projectile motion characteristics.</li> <li>6. Apply Newton's laws and conservation laws to motion of rigid bodies.</li> </ol>
15.	18BEEE311	Analog Electronics Lab	<ol style="list-style-type: none"> <li>1. Determine the output wave forms of Full Wave Rectifiers with and without filters.</li> <li>2. Draw the equivalent circuit of MOSFET and sketch the V-I characteristics.</li> <li>3. Design the Darlington amplifier and develop the circuit.</li> <li>4. Compare the theoretical and practical frequency response of Wein bridge oscillators.</li> <li>5. Design of a stable and Monostable multivibrators for generation of different waveforms</li> <li>6. Design of clipper and clamper.</li> </ol>
16.	18BEEE312	Electrical Machines Lab – I	<ol style="list-style-type: none"> <li>1. Analyze the characteristics of DC shunt generator DC compound generator and calculate critical resistance and critical speed</li> <li>2. Examine load characteristics of DC shunt, series and compound motor and identify its maximum efficiency operating point</li> <li>3. Estimate the efficiency of DC machines in different methods</li> <li>4. Sketch the load characteristics of single phase transformer, separate the different losses and find the efficiency</li> <li>5. Predetermine the equivalent circuit parameters of single-phase transformer in two different methods and compare the results</li> <li>6. 6. Estimate the efficiency of transformer.</li> </ol>
17.	17BEEE501	Power Electronics	<ol style="list-style-type: none"> <li>1. Understand the differences between signal level.</li> <li>2. Understand the differences between power level devices.</li> <li>3. Analyse controlled rectifier circuits.</li> <li>4. Analyse the operation of DC-DC choppers.</li> <li>5. Analyse the operation of voltage source inverters.</li> <li>6. Understand different modulation techniques.</li> </ol>
18.	17BEEE502	Digital Logic Circuits	<ol style="list-style-type: none"> <li>1. 1. Use numerical methods to analyse a power system in steady state.</li> <li>2. Understand stability constraints in a synchronous grid.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Understand methods to control the voltage, frequency.</li> <li>4. 4.Understand methods to control the power flow.</li> <li>5. 5.Understand the monitoring and control of a power system.</li> <li>6. 6. Understand the basics of power system economics</li> </ol>
19.	17BEEE503	Control System Engineering	<ol style="list-style-type: none"> <li>1. To understand the open loop and closed loop (feedback) systems</li> <li>2. To understand time domain and frequency domain analysis of control systems required for stability analysis.</li> <li>3. To understand the compensation technique that can be used to stabilize control systems</li> <li>4. Students can model any physical system in both time domain and frequency domain</li> <li>5. Students will be able to analyse the system and determine the stability property of system</li> <li>6. Students will be able to determine the controller for any system</li> </ol>
20.	17BEEE5E09	Distributed Generation	<ol style="list-style-type: none"> <li>1. Understand the distributed generation system, boiler turbine monitoring system.</li> <li>2. Understand the Planning of distributed system</li> <li>3. Analysis the control of DG inverters</li> <li>4. Analysis the protection of distributed systems</li> <li>5. Understand the real time system</li> <li>6. Analysis the norms and standards used in it</li> </ol>
21.	17BEEE5E12	Sensor And Transducer	<ol style="list-style-type: none"> <li>1. understand all types of sensors and transducers.</li> <li>2. Justify the concept and working principle of different transducers and sensors</li> <li>3. Justify the transducers that will be utilised in the electrical industries</li> <li>4. Identify recent developments in transducer domain</li> <li>5. Discover the knowledge for small technology up gradations in it</li> <li>6. 6. Analysis the real time application.</li> </ol>
22.	17BEEE511	Power Electronics Laboratory	<ol style="list-style-type: none"> <li>1. The students will be able to demonstrate the all-power semiconductor devices.</li> <li>2. To expose students to operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics.</li> <li>3. To provide a practical exposure to operating principles, design and synthesis of different power electronic converters.</li> <li>4. To introduce students to industrial control of power electronic circuits as well as safe electrical connection and measurement practices.</li> <li>5. Able to analyze power electronics circuits</li> <li>6. Able to apply power electronic circuits for different loads</li> </ol>
23.	17BEEE512	Analog And Digital Circuits Laboratory	<ol style="list-style-type: none"> <li>1. Verification of Logic gates.</li> <li>2. Design of digital circuit using logic gates.</li> <li>3. Design the code converter.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Design of shift registers.</li> <li>5. Design of Mux and De-mux.</li> <li>6. Design of timer using 555 IC.</li> </ol>
24.	17BEEE513	Control System Engineering Laboratory	<ol style="list-style-type: none"> <li>1. Determine the transfer function of DC Shunt Motor.</li> <li>2. Ability to find the frequency response of different compensators</li> <li>3. Ability to find the step response of P Controller.</li> <li>4. Ability to find the step response of PI &amp; PID Controller.</li> <li>5. Ability to identify the type of damping from the given Characteristic equation.</li> <li>6. Evaluate the speed control of Dc motor.</li> </ol>
25.	17BEEE552A*	Control And Maintenance For Electrical Motors	<ol style="list-style-type: none"> <li>1. Analysis the types of automatic starters for electrical motors.</li> <li>2. Analysis control circuits for braking, jogging, reversing operations.</li> <li>3. Analysis PLCs circuit for control applications.</li> <li>4. Program PLCs for controlling the motors.</li> <li>5. Analysis the single phase preventer circuits using PLC</li> <li>6. Analysis various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.</li> </ol>
26.	17BEEE552B*	Programmable Logic Controller (Plc)	<ol style="list-style-type: none"> <li>1. to understand the registers and functions in PLC and they are able to do the program.</li> <li>2. To acquire the knowledge of storage techniques in PLC</li> <li>3. Students know how to handle the data and functions</li> <li>4. Students known about advanced controller in PLC applications</li> <li>5. Students gather real time industrial application of PLC</li> <li>6. Students gathered and evaluate the flow charts of ladder and spray process system</li> </ol>
27.	16BECC701	Professional Ethics, Principle of Management and Entrepreneurship Development	<ol style="list-style-type: none"> <li>1. Apply ethics in society and realize the responsibilities and rights in the society</li> <li>2. Discuss the ethical issues related to engineering</li> <li>3. Advanced philosophical knowledge of the profession of recreation and leisure</li> <li>4. Synthesis of trends and issues as related to current professional practice</li> <li>5. Evaluation of organizational theories and human resource management principles.</li> <li>6. Ethical practice and ethical management</li> </ol>
28.	16BEEE702	Power System Protection and Switchgear	<ol style="list-style-type: none"> <li>1. Understand the different components of a protection system.</li> <li>2. Evaluate fault current due to different types of fault in a network.</li> <li>3. Understand the protection schemes for different power system components.</li> <li>4. Understand the basic principles of digital protection.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Understand system protection schemes, and the use of wide-area measurements.</li> <li>6. Analysis the Real time application of it.</li> </ol>
29.	16BEEE7E05	Power Quality	<ol style="list-style-type: none"> <li>1. 1.Evaluate the characteristics of ac transmission</li> <li>2. Reproduce the effect of shunt and series reactive compensation.</li> <li>3. Justify the working principles of FACTS devices and their operating characteristics.</li> <li>4. Reproduce the basic concepts of power quality.</li> <li>5. Rewrite the concept of Harmonics</li> <li>6. Reproduce and justify the working principles of devices to improve power quality.</li> </ol>
30.	16BEC SOE03	PC Hardware And Trouble Shooting	<ol style="list-style-type: none"> <li>1. Can identify the main components for the PC.</li> <li>2. Can Understand about power supplies and the skills to trouble-shoot various power-related problems.</li> <li>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.</li> <li>4. Familiarize themselves with PC memories such as RAM and ROM devices. This includes RAM types, RAM upgrading, ROM BIOS, and the CMOS chip.</li> <li>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.</li> <li>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 HDDs, high-level Formatting, and HDD partitioning using a variety of tools.</li> </ol>
31.	16BEECOE02	Consumer Electronics	<ol style="list-style-type: none"> <li>1. Gain knowledge about various speakers and microphone</li> <li>2. Gain knowledge about the fundamental of television systems and standards</li> <li>3. Understand the function and Components of a Remote Control.</li> <li>4. Gain knowledge about the process of audio recording and reproduction</li> <li>5. Gain knowledge about the various telephone networks.</li> <li>6. Gain the knowledge about servicing of Home appliances</li> </ol>

32.	16BEEE711	Power System Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Gain Computation of Parameters and Modelling of Transmission Lines.</li> <li>2. Understand the Formation of Bus Admittance and Impedance Matrices and Solution of Networks.</li> <li>3. Understand the Load Flow</li> <li>4. Gain knowledge of symmetrical and unsymmetrical Fault Analysis.</li> <li>5. Gain knowledge of Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System</li> <li>6. Understand the concept of Electromagnetic Transients in Power Systems.</li> </ol>
33.	18BEEE401	Digital Electronics	<ol style="list-style-type: none"> <li>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</li> <li>2. Apply the minimal SOP and POS forms of logic expression using K map and implement it with the combinational logic</li> <li>3. Analyze and design a synchronous sequential circuit to obtain a state table, state diagram for the time sequence of all the variables</li> <li>4. Analyze and design an asynchronous sequential circuit and describe the race conditions, hazards and errors in digital circuits</li> <li>5. Understanding the concepts of ROM, RAM and CAM</li> <li>6. Understanding the concepts of PLD and CPLD.</li> </ol>
34.	18BEEE402	Electrical Machines – II	<ol style="list-style-type: none"> <li>1. Understand the concept of AC machine windings.</li> <li>2. Understand the concepts of rotating magnetic fields.</li> <li>3. Understand the operation of ac machines.</li> <li>4. Analyse performance characteristics Induction Machines.</li> <li>5. To understand the different types of single-phase induction motor based on its starting methods.</li> <li>6. Understand the operation of synchronous motor and analyse the performance of motor under different loading and excitation conditions.</li> </ol>
35.	18BEEE403	Power Electronics	<ol style="list-style-type: none"> <li>1. Understand the differences between signal level.</li> <li>2. Understand the differences between power level devices.</li> <li>3. Analyse controlled rectifier circuits.</li> <li>4. Analyse the operation of DC-DC choppers.</li> <li>5. Analyse the operation of voltage source inverters.</li> <li>6. Understand different modulation techniques.</li> </ol>
36.	18BEEE404	Signals And Systems	<ol style="list-style-type: none"> <li>1. 1.Classify different types of signals and systems</li> <li>2. Understand the concepts of continuous time and discrete time systems.</li> <li>3. Analyse systems in complex frequency domain.</li> <li>4. Understand sampling theorem and its implications.</li> <li>5. Apply Z transform to solve problems on DT systems</li> </ol>

			6. Compute Discrete Fourier transform using Fast Fourier transform
37.	18BEEE405	Mathematics – III (Probability And Statistics)	<ol style="list-style-type: none"> <li>1. To apply statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.</li> <li>2. To learn the ideas of probability, random variables and various discrete and continuous probability distributions and their properties.</li> <li>3. To apply the basic ideas of statistics including measures of central tendency, correlation and regression.</li> <li>4. To study statistical methods of the sample data.</li> <li>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.</li> <li>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.</li> </ol>
38.	18BEEE406	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> <li>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.</li> </ol>
39.	18BEEE411	Digital Electronics Laboratory	<ol style="list-style-type: none"> <li>1. Verify the truth table of Logic Gates and Flip Flops.</li> <li>2. Apply Boolean functions to implement adder, subtractor circuits and convert Excess 3 to BCD, Binary to Gray code and vice versa.</li> <li>3. Design parity generator, parity checker, encoder and decoder circuits.</li> <li>4. Design and implement 4-bit modulo synchronous, Asynchronous counters and implement 4-bit shift registers in SISO, SIPO, PISO, PIPO modes.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Explain multiplexer, demultiplexer circuits and demonstrate 555 timer in Monostable and a stable operation.</li> <li>6. Design and demonstrate inverting amplifier, non-inverting amplifier, adder, comparator, integrator and differentiator circuits using Op-Amp.</li> </ol>
40.	18BEEE412	Power Electronics Laboratory	<ol style="list-style-type: none"> <li>1. The students will be able to demonstrate the all power semiconductor devices.</li> <li>2. To expose students to operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics.</li> <li>3. To provide a practical exposure to operating principles, design and synthesis of different power electronic converters.</li> <li>4. To introduce students to industrial control of power electronic circuits as well as safe electrical connection and measurement practices.</li> <li>5. Able to analyze power electronics circuits</li> <li>6. Able to apply power electronic circuits for different loads</li> </ol>
41.	18BEEE413	Electrical Machines Laboratory – II	<ol style="list-style-type: none"> <li>1. Compare the different indirect testing methods to predetermine the voltage regulation of three phase salient and non-salient pole alternator</li> <li>2. Determine the positive, negative and zero sequence impedance of alternators</li> <li>3. Analyze the operation of synchronous motor on infinite bus for different excitation condition</li> <li>4. Assess the performance of three phase induction motor by conducting direct and indirect testing</li> <li>5. Assess the performance of single phase induction motor by conducting direct and indirect testing</li> <li>6. Choose the appropriate induction motor starter for various industrial and commercial applications</li> </ol>
42.	17BEEE601	Solid State Drives	<ol style="list-style-type: none"> <li>1. understand the concept of drive characteristics and various converters used for drives.</li> <li>2. understand the operation of electric drives controlled from a power electronic converter.</li> <li>3. understand the stable steady–state operation and transient dynamics of a motor–load system.</li> <li>4. analyse the operation of the converter/chopper fed dc drive and to solve simple problems.</li> <li>5. Understand the operation of both classical and modern induction motor drives.</li> <li>6. Understand the differences between synchronous motor drive and induction motor drive and to learn the basics of permanent magnet synchronous motor drives.</li> </ol>
43.	17BEEE602	Power System Analysis	<ol style="list-style-type: none"> <li>1. Understand the concepts of power systems.</li> <li>2. Understand the various power system components.</li> <li>3. Evaluate fault currents for different types of faults.</li> <li>4. Understand the generation of over-voltages and insulation coordination.</li> <li>5. Understand basic protection schemes.</li> </ol>

			6. Understand concepts of HVDC power transmission and renewable energy generation.
44.	17BEEE603A/ 17BEEE603B	Microprocessor & Microcontroller	<ol style="list-style-type: none"> <li>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</li> <li>2. Develop the assembly language program using mnemonics and corresponding machine code based on architecture of 8051 microprocessor</li> <li>3. Define the 8051 micro-controller with its architecture, pinouts, memory organization, interrupts and compare the programming concepts with 8051</li> <li>4. Illustrate the interfacing of 8085 with various peripheral devices for transmission, reception and control of data</li> <li>5. Make use of the data conversion technique such as ADC and DAC and to interface with 8085 processor and 8051 micro-controller</li> <li>6. Develop the microcontroller assembly language program for various real time applications</li> </ol>
45.	17BEEE604	Design Of Electrical Apparatus	<ol style="list-style-type: none"> <li>1. Understand the construction of electrical machines.</li> <li>2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines</li> <li>3. Understand the principles of electrical machine design</li> <li>4. carry out a basic design of an AC and DC machine.</li> <li>5. Use software tools to do design calculations.</li> <li>6. Understand performance characteristics of electrical machines.</li> </ol>
46.	17BEEE6E05	High Voltage Engineering	<ol style="list-style-type: none"> <li>1. To understand the various types of over voltages in power system and Protection methods.</li> <li>2. To study about generation of over voltages in laboratories. To know about measurement of over voltages.</li> <li>3. To study about the nature of Breakdown mechanism in solid, liquid and gaseous</li> <li>4. dielectrics</li> <li>5. discussion on commercial insulates.</li> <li>6. To study about testing of power apparatus and insulation coordination</li> </ol>
47.	17BEEE6E10	Biomedical Instrumentation	<ol style="list-style-type: none"> <li>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</li> <li>2. To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration. Methods of different transducers used.</li> <li>3. To introduce the student to the various sensing and measurement devices of electrical origin.</li> </ol>

			<ol style="list-style-type: none"> <li>4. To provide the latest ideas on devices of non-electrical devices.</li> <li>5. To bring out the important and modern methods of imaging techniques.</li> <li>6. To provide latest knowledge of medical assistance / techniques and therapeutic equipment.</li> </ol>
48.	17BEEE611	Microprocessor And Micro Controller Laboratory	<ol style="list-style-type: none"> <li>1. Apply the basic arithmetic and logical operations using 8085 microprocessor with the help of assembly language programming</li> <li>2. Analyze the performance of different weighted and non-weighted codes, its conversions with logic diagram using 8085 microprocessor</li> <li>3. Illustrate the interfacing of 8085 with various peripheral devices for serial and parallel communication of data</li> <li>4. Demonstrate the basic instructions with 8051 microcontroller execution including conditional jumps, looping and calling subroutines</li> <li>5. Make use of the basic conversion techniques of ADC and DAC to interface it with 8085 processor and 8051 microcontroller</li> <li>6. Develop a model using processor to apply computing platform and software for engineering problems</li> </ol>
49.	17BEEE612	Electrical Estimation And Rewinding Laboratory	<ol style="list-style-type: none"> <li>1. At the end of the course the students will be able to do wiring and winding for all electrical equipment's.</li> <li>2. To analysis the electrical estimation for residential flat</li> <li>3. To analysis the electrical estimation for University building</li> <li>4. To analysis the electrical estimation for Primary health centre</li> <li>5. To analysis the electrical estimation for Party hall</li> <li>6. To analysis the electrical estimation for Saw mill</li> </ol>
50.	17BEEE651*	PCB Design and Servicing of Domestic Appliances	<ol style="list-style-type: none"> <li>1. Techniques of PCBs</li> <li>2. PCB Fabrication</li> <li>3. Real time application of PCB</li> <li>4. PCB component assembly processes</li> <li>5. Service to domestic appliances</li> <li>6. Installation of domestic appliances</li> </ol>
51.	16BECC801A	Energy Management, Utilization and Auditing	<ol style="list-style-type: none"> <li>1. Understand the concept of Energy Management.</li> <li>2. Analyze the different methods for economic analysis</li> <li>3. Knowledge about the basic concept of Energy Audit and types.</li> <li>4. Evaluate the different energy efficient motors</li> <li>5. Understand the concept of Energy conservation.</li> <li>6. Investigate the different methods to improve power factor.</li> </ol>
52.	16BEEE8E03	Power Generation Systems	<ol style="list-style-type: none"> <li>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.</li> </ol>

			<ol style="list-style-type: none"><li>2. The student also gain knowledge about distributed generation, boiler turbine monitoring system.</li><li>3. To get knowledge in Powerplant instrumentation</li><li>4. Students acquire knowledge of renewable power system</li><li>5. Acquire knowledge about economics in power generation</li><li>6. Knowledge in Load demand and factor</li></ol>
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Name of the Department: **Food Technology**

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

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BTFT101	Mathematics – I	<ol style="list-style-type: none"><li>1. Evaluate the limits and continuity of various functions.</li><li>2. Apply various techniques to solve Partial Differential Equations</li><li>3. Find an appropriate method to solve the given integral.</li><li>4. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition change of order and vector integration.</li><li>5. Solve simple standard examples using the ideas of differential equations.</li><li>6. Apply the knowledge acquired to solve various engineering problems.</li></ol>
2.	19BTFT141	Chemistry - I	<ol style="list-style-type: none"><li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li><li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li><li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li><li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li><li>5. List major chemical reactions that are used in the synthesis of molecules.</li><li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li></ol>
3.	19BTFT142	Basic Electrical Engineering	<ol style="list-style-type: none"><li>1. understand and analyse basic electric and magnetic circuits.</li><li>2. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li><li>3. Attributing the electrical machines and transformer.</li><li>4. Evaluate the various circuits in real time applications.</li><li>5. Analysis various semiconductor devices in real time applications.</li><li>6. Reproduce the Measuring Instruments and Electrical Installation.</li></ol>
4.	19BTFT111	Engineering Graphics And Design	<ol style="list-style-type: none"><li>1. Introduction to engineering design and its place in society</li><li>2. Exposure to the visual aspects of engineering design and engineering graphics standards</li></ol>

			<ol style="list-style-type: none"> <li>3. Exposure to solid modelling, computer-aided geometric design, creating working drawings and engineering communication</li> <li>4. Exposure to 3D free hand sketching.</li> <li>5. Acquired the knowledge of projections of points, lines and plane surfaces.</li> <li>6. Understand the basic concept of projection of solids.</li> </ol>
5.	19BTFT201	Mathematics – II	<ol style="list-style-type: none"> <li>1. Apply advanced matrix knowledge to engineering problems.</li> <li>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.</li> <li>3. Find the Analytic functions using the Cauchy Riemann equations and discuss how geometric structures are changing under conformal mappings.</li> <li>4. Evaluate complex integrals using the Cauchy's integral formula and the Residue theorem.</li> <li>5. Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.</li> <li>6. Apply the concept of Matrices, Vector calculus, Analytic functions, Complex integration and Laplace transforms in Engineering fields.</li> </ol>
6.	19BTFT202	English	<p>Students undergoing this course will be able to</p> <ol style="list-style-type: none"> <li>1. Describe English language for communication: verbal &amp; non –verbal.</li> <li>2. Express comprehension and acquisition of speaking &amp; writing ability.</li> <li>3. Improve the student confidence in using English language in real life situations.</li> <li>4. Develop word power: lexical, grammatical and communication competence.</li> <li>5. To prepare the students to write business letters and other forms of technical writing.</li> <li>6. Demonstrate the students to prepare for oral communication in formal contexts.</li> </ol>
7.	19BTFT241	Engineering Physics	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Identify the elastic nature of materials.</li> <li>2. Infer the concepts of sound waves and its applications through the study of acoustics</li> <li>3. Extend the concept of ultrasonics for industrial applications.</li> <li>4. Illustrate the thermal properties of materials through various methods.</li> <li>5. Infer the characteristics of laser and optical fiber for various engineering applications.</li> <li>6. Identify the different atomic arrangements of crystals and its defects.</li> </ol>

8.	19BTFT242	Programming For Problem Solving	<p>The course will enable the students</p> <ol style="list-style-type: none"> <li>1. To formulate simple algorithms for arithmetic and logical problems</li> <li>2. To translate the algorithms to programs (in C language)</li> <li>3. To test and execute the programs and correct syntax and logical errors</li> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
9.	19BTFT243	Food Chemistry	<ol style="list-style-type: none"> <li>1. Describe the various classifications, properties, applications and analysis of carbohydrates.</li> <li>2. Summarize the conformations, properties and functional role of proteins</li> <li>3. Explain the classification, chemistry, sources and applications of lipids</li> <li>4. Illustrate the structure, types, stability and degradation of important biomolecules.</li> <li>5. Evaluate the natural and synthetic food colourants, flavors, aromas and other antinutritional components.</li> <li>6. Demonstrate the use of food composition tables and databases.</li> </ol>
10.	18BTFT301	Transforms And Partial Differential Equation	<ol style="list-style-type: none"> <li>1. Understand how to solve the given standard partial differential equations.</li> <li>2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.</li> <li>3. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.</li> <li>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.</li> <li>5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.</li> <li>6. The learners can equip themselves in the transform techniques and solve partial differential equations.</li> </ol>

11.	18BTFT302	Fluid Mechanics	<ol style="list-style-type: none"> <li>1. Recognize the various properties of fluids.</li> <li>2. Assess the pressure differences in fluids.</li> <li>3. Apply the different devices to measure the pressure of fluids.</li> <li>4. Calculate the forces acting on bodies submerged in different positions in liquids.</li> <li>5. Perform the basic design calculations for fluid flow in pipes</li> <li>6. Identify the behavior of flow of fluids in pipes.</li> </ol>
12.	18BTFT303	Food Microbiology	<ol style="list-style-type: none"> <li>1. Recognize the general concepts and factors affecting the growth of microorganisms.</li> <li>2. Apply the different temperature range as a control agent for food preservation.</li> <li>3. Employ the methods include drying, additives and radiation to prevent microbial spoilage.</li> <li>4. Use microbial cultures for preparing various fermented food products.</li> <li>5. Evaluate the pathogenesis of food borne pathogens and food poisoning.</li> <li>6. Assess the bacteriology of water and sanitation measures in food industries</li> </ol>
13.	18BTFT304	Food Process Calculations	<ol style="list-style-type: none"> <li>1. To enumerate the units and dimensions of various physical quantities.</li> <li>2. To express the laws and theory of gases and vapours.</li> <li>3. To calculate the material balance in food processing units.</li> <li>4. To validate the energy balance involved in food processing operations.</li> <li>5. Describe the types and properties of fluid flow.</li> <li>6. Demonstrate the processes of agitation in fluids</li> </ol>
14.	18BTFT305	Thermodynamics	<ol style="list-style-type: none"> <li>1. Understand the laws, concepts and principles of thermodynamics.</li> <li>2. Apply first law of thermodynamics to closed and open systems.</li> <li>3. Solve problems related to cycles and cyclic devices using second law of thermodynamics.</li> <li>4. Calculate the thermodynamic properties of pure substances and phase change processes</li> <li>5. Discuss the classification, working and accessories of steam boilers.</li> <li>6. Understand the working of carnot, vapour compression, vapor absorption and air refrigeration systems.</li> </ol>
15.	18BTFT306	Food Biochemistry And Human Nutrition	<ol style="list-style-type: none"> <li>1. Discuss the digestion, absorption and metabolic pathways of carbohydrates.</li> <li>2. Understand the digestion absorption synthesis and metabolism of amino acids and proteins.</li> <li>3. Infer the digestion absorption synthesis and metabolism of fatty acids.</li> <li>4. Understand the basic principles and overall concepts of food relating to nutrition.</li> <li>5. List the diets suitable for managing nutrition related disorder.</li> </ol>

			6. Outline the nutritional requirements for different age groups, sports, pregnancy.
16.	18BTFT311	Food Microbiology Laboratory	<ol style="list-style-type: none"> <li>1. Use aseptic technique to properly handle microorganisms to avoid contamination.</li> <li>2. Apply the knowledge to handle microscopes to observe stained microorganisms.</li> <li>3. Enumerate the microorganisms to check the quality characteristics of food.</li> <li>4. Isolate the pure culture from mixed population found in contaminated foods.</li> <li>5. Identify the microorganisms using staining techniques.</li> <li>6. Assess the quality of water and milk.</li> </ol>
17.	18BTFT312	Food Biochemistry Lab	<ol style="list-style-type: none"> <li>1. Examine the protein content of food samples using Lowry's and Biuret method</li> <li>2. Perform the tests on quantifying carbohydrate content in the food samples.</li> <li>3. Evaluate the amount of ascorbic acid in the given food materials.</li> <li>4. Measure the ash content and sample preparation of the AAS analysis.</li> <li>5. Determine the fat and cholesterol content in the food samples.</li> <li>6. Assess the calculations on protein quality indices.</li> </ol>
18.	18BTFT351	Constitution Of India	<ol style="list-style-type: none"> <li>1. Understand the functions of the Indian government.</li> <li>2. Understand and abide the rules of the Indian constitution.</li> <li>3. Understand and appreciate different culture among the people.</li> <li>4. Understand the Structure and Functions of Indian constitution</li> <li>5. Understand the Assessment of Parliamentary System in India.</li> <li>6. Understand the Rights of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections</li> </ol>
19.	18BTFT401	Probability And Statistics	<ol style="list-style-type: none"> <li>1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.</li> <li>2. Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.</li> <li>3. Apply the concept of testing of hypothesis for small and large samples in real life problems.</li> <li>4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.</li> <li>5. Have the notion of sampling distributions and statistical techniques used in engineering and management problems.</li> </ol>

			6. To expose statistical methods designed to contribute to the process of making the judgements.
20.	18BTFT402	Engineering Properties Of Food Materials	<ol style="list-style-type: none"> <li>1. Estimate the physical properties of food materials</li> <li>2. Report the frictional properties and storage of agricultural crops</li> <li>3. Compare and contrast the Newtonian and non-Newtonian fluids</li> <li>4. Express the overall thermal properties of food materials</li> <li>5. Measure the aero- and hydrodynamic characteristics and the application of frictional properties in grain handling, processing and conveying.</li> <li>6. Demonstrate the dielectric and radiation heating properties of foods</li> </ol>
21.	18BTFT403	Heat And Mass Transfer	<ol style="list-style-type: none"> <li>1. Express the Conduction mode of heat transfer in simple and composite systems</li> <li>2. Evaluate heat transfer coefficients for natural convection.</li> <li>3. Discuss the influence of radiation in food processing operations</li> <li>4. Analyze heat exchanger performance by using the method of heat exchanger effectiveness</li> <li>5. Analyze heat exchanger performance by using the method of log mean temperature difference.</li> <li>6. Illustrate the basics of diffusion mass transfer and its application in food Processing.</li> </ol>
22.	18BTFT404	Food Analysis	<ol style="list-style-type: none"> <li>1. Test the proximate composition of the given food sample</li> <li>2. Determine the physical, chemical and quality standards of lipids, proteins and carbohydrates</li> <li>3. Investigate the adulterants in the given food commodities</li> <li>4. Examine the composition of foods using spectroscopic methods</li> <li>5. Analyze the food materials using chromatographic techniques</li> <li>6. Perform the tests on food substances using the principles of electrophoresis, refractometry and polarimetry</li> </ol>
23.	18BTFT405	Unit Operations In Food Processing	<ol style="list-style-type: none"> <li>1. Explain the models involved in the moisture and its measurements.</li> <li>2. Investigate the various dryers employed in drying of food.</li> <li>3. Demonstrate the filtration, sedimentation and centrifugal separations.</li> <li>4. Evaluate the heat transfer coefficients and economy of different types of evaporators.</li> <li>5. Estimate the energy and power requirement for the different size reduction operations.</li> <li>6. 6. Design and develop the agitators and impellers for mixing operations.</li> </ol>

24.	18BTFT406	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> <li>5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
25.	18BTFT411	Food Analysis Laboratory	<ol style="list-style-type: none"> <li>1. Test the iodine content in iodized salt</li> <li>2. Examine the saponification and iodine value of lipids</li> <li>3. Analyze the fat, iron and reducing sugar in the given foods</li> <li>4. Evaluate the swelling ratio and extract release of meat</li> <li>5. Assess the curcumin and gingerol content in the spices</li> <li>6. Calculate the nitrogen content by Kjeldhal analyzer</li> </ol>
26.	18BTFT412	Fluid Mechanics And Heat Transfer Lab	<ol style="list-style-type: none"> <li>1. Calculate the discharge coefficient of fluids at various conditions</li> <li>2. Perform the experiment on flow of fluids</li> <li>3. Asses the pressure drop across different columns</li> <li>4. Demonstrate the heat transfer equipments and their performance.</li> <li>5. Measure the efficiency of filtration process</li> <li>6. Evaluate the heat transfer through composite wall</li> </ol>

Name of the Department: **MECHANICAL ENGINEERING**

**Course:** B.E. Mechanical Engineering

Sl. No	Course Code	Name of the Course	Course Outcomes
1.	19BEME101	Mathematics I (Calculus and Linear Algebra for Mechanical & Automobile Engineering)	The students will learn to: <ol style="list-style-type: none"><li>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.</li><li>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</li><li>3. Invent the tool of power series for learning advanced Engineering Mathematics.</li><li>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.</li><li>5. Analyze differential equations using Fourier series analysis which plays a vital role in engineering applications.</li><li>6. Equips students to have basic knowledge and understanding in one field of materials, differential calculus</li></ol>
2.	19BEME141	Electromagnetism and Modern Physics	Upon completion of this course, the students will be able to <ol style="list-style-type: none"><li>1. Analyze field potentials due to static charges and apply for electrostatic applications.</li><li>2. Understand the concepts of magnetic field and apply for electromagnetic applications.</li><li>3. Analyse the concepts of advanced physics in quantum theory and its applications in electron microscopes</li><li>4. Integrate the properties on vacuum and its applications in various pumps and gauges.</li><li>5. Apply the knowledge inputs of the course for engineering applications.</li><li>6. Apply the knowledge inputs of the course for engineering applications.</li></ol>
3.	19BEME142	Basic Electrical Engineering	<ol style="list-style-type: none"><li>7. understand and analyse basic electric and magnetic circuits.</li><li>8. Attributing the electric circuits with DC and AC excitation by applying various circuit laws.</li><li>9. Attributing the electrical machines and transformer.</li><li>10. Evaluate the various circuits in real time applications.</li><li>11. Analysis various semiconductor devices in real time applications.</li><li>12. Reproduce the Measuring Instruments and Electrical Installation.</li></ol>

4.	19BEME111	Engineering Graphics – I	<p>7. Introduction to engineering design and its place in society</p> <p>8. Exposure to the visual aspects of engineering design and engineering graphics standards</p> <p>9. Exposure to solid modelling, computer-aided geometric design, creating working drawings and engineering communication</p> <p>10. Exposure to 3D free hand sketching.</p> <p>11. Acquired the knowledge of projections of points, lines and plane surfaces.</p> <p>12. Understand the basic concept of projection of solids.</p>
5.	19BEME201	Mathematics II (Calculus, Ordinary Differential Equations and Complex Variable for Mechanical and Automobile Engineering)	<p>The students will learn:</p> <p>7. Apply integration to compute multiple integrals, area, volume, integrals in polar and Cartesian coordinates, in addition to change of order and vector integration.</p> <p>8. Analyze first order differential equations utilizing the standard techniques for separable, exact, linear, Bernoulli cases.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>12. Explain the fundamentals and basic concepts in vector calculus, ODE, complex functions and problems related to engineering applications by using these techniques.</p>
6.	19BEME202	English	<p>Students undergoing this course will be able to</p> <p>1. Describe English language for communication: verbal &amp; non-verbal.</p> <p>2. Express comprehension and acquisition of speaking &amp; writing ability.</p> <p>3. Improve the student confidence in using English language in real life situations.</p> <p>4. Develop word power: lexical, grammatical and communication competence.</p> <p>5. To prepare the students to write business letters and other forms of technical writing.</p> <p>6. Demonstrate the students to prepare for oral communication in formal contexts.</p>

7.	19BEME241	Chemistry-I	<ol style="list-style-type: none"> <li>1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.</li> <li>2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.</li> <li>3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques</li> <li>4. Rationalise bulk properties and processes using thermodynamic considerations.</li> <li>5. List major chemical reactions that are used in the synthesis of molecules.</li> <li>6. Integrate the chemical principles in the projects undertaken in field of engineering and technology</li> </ol>
8.	19BEME242	Programming For Problem Solving	<p>The course will enable the students</p> <ol style="list-style-type: none"> <li>1. To formulate simple algorithms for arithmetic and logical problems</li> <li>2. To translate the algorithms to programs (in C language)</li> <li>3. To test and execute the programs and correct syntax and logical errors</li> <li>4. To implement conditional branching, iteration and recursion</li> <li>5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach</li> <li>6. To use arrays, pointers and structures to formulate algorithms and programs</li> <li>7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems</li> <li>8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.</li> </ol>
9.	19BEME211	Workshop / Manufacturing Practices Laboratory	<ol style="list-style-type: none"> <li>1. The students will gain knowledge of the different manufacturing processes.</li> <li>2. To fabricate components using different materials.</li> <li>3. Students will be able to fabricate components with their own hands.</li> <li>4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances</li> <li>5. By assembling different components with different processes.</li> <li>6. They will be able to produce small devices of their interest</li> </ol>
10.	19BEME212	Engineering Graphics II	<ol style="list-style-type: none"> <li>1. The students to draw section of solids like Prism, Cylinder, and Pyramid.</li> <li>2. Students can prepare true shape of section.</li> <li>3. Students gain the knowledge on lateral surfaces.</li> </ol>

			<ol style="list-style-type: none"> <li>4. 4.Students acquire the knowledge about development of surfaces like Prisms, pyramids, cylinders and cones.</li> <li>5. Students gain the knowledge on 2D drawing using CAD software.</li> <li>6. Students acquire the knowledge on basics of 3D modelling packages.</li> </ol>
11.	19BEME205	Constitution of India	<p>Upon completion of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the functions of the Indian government.</li> <li>2. Understand the functions of the state government.</li> <li>3. Understand the relations between central and state government.</li> <li>4. Understand and abide the rules of the Indian constitution.</li> <li>5. Understand and appreciate different culture among the people.</li> <li>6. Understand the Rights of Women, Children and other Weaker Sections.</li> </ol>
12.	18BEME301	Mathematics III	<ol style="list-style-type: none"> <li>1. The fundamental concepts of partial differential equations and the various solution procedures for solving the first order non-linear partial differential equations.</li> <li>2. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.</li> <li>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.</li> <li>4. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.</li> <li>5. They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data</li> <li>6. Apply the concept of testing of hypothesis for small and large samples in real life problems.</li> </ol>
13.	18BEME302	Biology For Engineers	<ol style="list-style-type: none"> <li>1. Summarize the cell structures and its functions</li> <li>2. Explain the Biomolecules functions</li> <li>3. Classify the communicable and non-communicable human diseases</li> <li>4. Illustrate the different organ function tests</li> <li>5. Tell the applications of biology in environmental applications</li> <li>6. Describe the concept of biomechanics</li> </ol>
14.	18BEME303	Engineering Mechanics	<ol style="list-style-type: none"> <li>1. Draw free body diagrams and determine the resultant of forces and/or moments.</li> <li>2. Determine the centroid and second moment of area of sections.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.</li> <li>4. Analyse statically determinate planar frames.</li> <li>5. Analyse the motion and calculate trajectory characteristics.</li> <li>6. Apply Newton's laws and conservation laws to elastic collisions and motion of rigid bodies.</li> </ol>
15.	18BEME304	Thermodynamics	<ol style="list-style-type: none"> <li>1. Understand the first law and able to differentiate closed and open system, also able to apply first law to both types of systems</li> <li>2. Define the physical description of second law and its application to heat engine, refrigerator and heat pump.</li> <li>3. Also understand the concepts of entropy and able to find out the entropy generated in a thermodynamic system</li> <li>4. Understand the properties of pure substance and ideal gas concepts</li> <li>5. Describe the importance of availability concept and able to apply the thermodynamic relations in applications.</li> <li>6. Understand the psychrometric properties and various processes to create human comfort at various physical conditions.</li> </ol>
16.	18BEME341	Basic Electronics Engineering (Theory)	<ol style="list-style-type: none"> <li>1. Understand the principles of semiconductor devices and their applications.</li> <li>2. Understand the concept of voltage regulators</li> <li>3. Design an application using Operational amplifier.</li> <li>4. Understand the working of timing circuits and oscillators.</li> <li>5. Understand logic gates, flip flop as a building block of digital systems.</li> <li>6. Learn the basics of Electronic communication system.</li> </ol>
17.	18BEME341	Basic Electronics Engineering (Laboratory)	<ol style="list-style-type: none"> <li>1. Design amplifiers, oscillators, D-A converters using operational amplifier</li> <li>2. Analyze the characteristics of basic electronic devices with various configurations.</li> <li>3. Design and Test the digital logic circuits.</li> <li>4. Design and Test sequential circuits</li> <li>5. Construct multivibrators using 555.</li> <li>6. Understand the concept of Flipflop using Logic gates.</li> </ol>

18.	17BEME501	Heat Power Engineering	<ol style="list-style-type: none"> <li>1. Analyze the performance of various gas power cycles and IC engines.</li> <li>2. Understand the working principles of different types of steam generators, mountings and accessories.</li> <li>3. Understand the shape of blades, work output of typical turbine stages with its velocity diagram.</li> <li>4. Show the difference in working principle and performance of reciprocating and rotary compressors.</li> <li>5. Perform the cooling and heating load calculations for a specified application.</li> <li>6. Apply the basic thermodynamic concepts in various engineering applications.</li> </ol>
19.	17BEME502	Design Of Machine Elements	<ol style="list-style-type: none"> <li>1. Determine various types of stresses induced in different machine members.</li> <li>2. Design shaft and couplings for effective transmission of power.</li> <li>3. Select the type of welded joints and fasteners required for various industrial applications.</li> <li>4. Design springs and flywheels for various engineering applications.</li> <li>5. Design bearings and levers for engineering applications.</li> <li>6. Implement design procedure for designing a machine.</li> </ol>
20.	17BEME503	Dynamics Of Machinery	<ol style="list-style-type: none"> <li>1. Analyze the static and dynamic forces in various mechanisms.</li> <li>2. Determine the rotating masses in dynamic balancing.</li> <li>3. Calculate free and forced vibration for practical applications.</li> <li>4. Analyze torsional vibrations in mechanical components.</li> <li>5. Understand the principles in mechanisms used for speed control and stability control.</li> <li>6. Select the type of governors and gyroscopes for different applications.</li> </ol>
21.	17BEME5E04	Hydraulics And Pneumatics Power Control	<ol style="list-style-type: none"> <li>1. Recognize symbols and fundamentals in fluid power generation and distribution.</li> <li>2. Identify power source for hydraulic systems.</li> <li>3. Select appropriate components used in various hydraulic systems.</li> <li>4. Design hydraulic circuits for given applications</li> <li>5. Distinguish the components used in pneumatic circuits.</li> <li>6. Create the logic circuits for controlling electro-hydraulic/ pneumatic systems.</li> </ol>
22.	17BEME5E06	Renewable Energy Sources	<ol style="list-style-type: none"> <li>1. Determine the impacts of harnessing different renewable energy.</li> <li>2. Analyse and design solar cells so as to improve its performance.</li> <li>3. Explain energy generation techniques in wind mills, tide and geo thermal power plant.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Understand the technique of harvesting energy from bio mass and bio wastes</li> <li>5. Perform economic analysis for OTEC power plants.</li> <li>6. Get basic knowledge on fuel cells, solar cells, thermionic generators etc.</li> </ol>
23.	17BEME511	Scientific Computing Laboratory	<ol style="list-style-type: none"> <li>1. Apply numerical methods to find our solution of algebraic equations using different methods.</li> <li>2. Understand the different conditions, and numerical solution of system of algebraic equations.</li> <li>3. Apply various interpolation methods and finite difference concepts.</li> <li>4. Can apply numerical differentiation and integration whenever and wherever routine methods are not applicable.</li> <li>5. Work numerically on the ordinary differential equations using different methods through the theory of finite differences</li> <li>6. Work numerically on the partial differential equations using different methods through the theory of finite differences.</li> </ol>
24.	17BEME512	Dynamics And Metrology Laboratory	<ol style="list-style-type: none"> <li>1. Understand the working of various governors.</li> <li>2. Determine of jump speed and profile of the cam</li> <li>3. Determine moment of inertia by oscillation method for connecting rod and flywheel.</li> <li>4. Characterize and calibrate measuring devices.</li> <li>5. Measure taper angle straightness, flatness, surface finish and thread parameters.</li> <li>6. Examine the limits of dimensional tolerances using comparators.</li> </ol>
25.	17BEME513	Thermal Engineering Laboratory I	<ol style="list-style-type: none"> <li>1. Sketch the valve timing diagram for four stroke diesel engine and petrol engines.</li> <li>2. Sketch the port timing diagram for single cylinder two stroke diesel engine and petrol engines.</li> <li>3. Calculate the mechanical efficiency of four stroke SI engine by Morse test.</li> <li>4. Evaluate the performance of four stroke single cylinder CI engine.</li> <li>5. Evaluate the performance of steam generator and steam turbines.</li> <li>6. Measure the flash and fire point of various fuel/lubricants.</li> </ol>
26.	16BECC701	Professional Ethics, Principles Of Management And Entrepreneurship Development	<ol style="list-style-type: none"> <li>1. Prepare objectives, Strategies, Policies and Plan.</li> <li>2. Execute plans by directing and controlling.</li> <li>3. Understand the need of Engineering Ethics.</li> <li>4. Understand the forces that shape culture.</li> <li>5. Show the entrepreneurial skills.</li> <li>6. Execute an engineering plan with ethics.</li> </ol>
27.	16BEME702	Mechatronic Systems	<ol style="list-style-type: none"> <li>1. Implement the concepts of sensors and transducers.</li> <li>2. Design the actuation systems.</li> <li>3. Understand the architecture of microprocessors.</li> <li>4. Create the PLC program using ladder logic.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Design mechatronic system.</li> <li>6. Develop the controller model for electrical, mechanical and thermal systems.</li> </ol>
28.	16BEME7E02	Additive Manufacturing	<ol style="list-style-type: none"> <li>1. Understand the need for additive manufacturing technology</li> <li>2. Explain the process involved in Additive manufacturing technology</li> <li>3. Get knowledge on software's used in additive manufacturing technology</li> <li>4. Describe the working of SLS and other techniques</li> <li>5. Apply the additive manufacturing technology in medical field</li> <li>6. Applications of additive manufacturing technology in bio stream.</li> </ol>
29.	16BEME7E03	Composite Materials	<ol style="list-style-type: none"> <li>1. Select the various types of composite matrix required for an application.</li> <li>2. Choose appropriate manufacturing process for polymer matrix composite.</li> <li>3. opt appropriate manufacturing process for metal matrix composite.</li> <li>4. Use the concepts of ceramic composites and its production techniques.</li> <li>5. Identify the type of carbon-carbon composite for different industrial application.</li> <li>6. Explain the various advances in composites</li> </ol>
30.	16BEME7E04	Refrigeration And Air Conditioning	<ol style="list-style-type: none"> <li>1. Calculate COP of various refrigeration cycles.</li> <li>2. Choose appropriate refrigerants for various applications.</li> <li>3. Identify the use of unconventional refrigerant system for industrial application.</li> <li>4. Calculate the properties of air using psychrometric chart.</li> <li>5. Calculate cooling load for a given system</li> <li>6. Select the appropriate air conditioning system for industrial and domestic applications.</li> </ol>
31.	16BEAEOE02	Basics Of Two And Three Wheelers	<ol style="list-style-type: none"> <li>1. Understand gyroscopic effect and pendulum effect of two and three wheelers.</li> <li>2. Gain the knowledge about power units and ignition systems of 2 stoke and 4 stoke SI engines and CI engines.</li> <li>3. Understand the concept in design of gear box and gear change mechanism.</li> <li>4. Gain the knowledge about frames and suspension system.</li> <li>5. Understand the concept of wheel alignment.</li> <li>6. Gain the knowledge about Auto rickshaws, Pick-Ups and delivery type vehicles.</li> </ol>

32.	16BTAROE01	Non-Destructive Testing	<ol style="list-style-type: none"> <li>1. Understand the codes, standards and specifications related to NDT</li> <li>2. Classify the destructive and non-destructive tests and state their applications</li> <li>3. Develop NDT techniques for various products.</li> <li>4. Acquire skills needed for selection of appropriate NDT technique(s) for new inspection jobs</li> <li>5. Acquire sound knowledge of established NDE techniques and basic familiarity of emerging NDE techniques.</li> <li>6. Make use of standards application area of NDET</li> </ol>
33.	16BEME711	CAE / CAM Laboratory	<ol style="list-style-type: none"> <li>1. Describe the software tools needed to analyze engineering problems.</li> <li>2. Describe the different applications of simulation and analysis tools.</li> <li>3. Understand the features of CNC Machine Tool.</li> <li>4. Prepare part programming for machining a work.</li> <li>5. Perform operations in CNC lathe using Siemens.</li> <li>6. Perform operations in CNC Vertical Machining Centre using Fanuc.</li> </ol>
34.	16BEME791	Project Work - Phase I	<ol style="list-style-type: none"> <li>1. Develop the ability to fabrication skill.</li> <li>2. Ability to make literature review till the successful solution.</li> <li>3. Ability to identify specific problems.</li> <li>4. Gain the knowledge about data collection and conducting experiments.</li> <li>5. Develop the skill to prepare the project reports</li> <li>6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.</li> </ol>
35.	18BEME401	Instrumentation And Control Systems	<ol style="list-style-type: none"> <li>1. Understand the measurement systems, their accuracy &amp; range.</li> <li>2. Measure the quantities like displacement, temperature, pressure</li> <li>3. Measure the quantities like level, flow and speed</li> <li>4. Measure the quantities like strain, humidity and force</li> <li>5. Measure the quantities like torque and power</li> <li>6. Classify the various control methods and its application and do system models and perform response analysis</li> </ol>
36.	18BEME402	Environmental Studies	<ol style="list-style-type: none"> <li>1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.</li> <li>6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.</li> </ol>
37.	18BEME441	Engineering Materials And Metallurgy (Theory)	<ol style="list-style-type: none"> <li>1. Identify the metallurgical aspects of metals.</li> <li>2. Identify suitable heat treatment processes for various applications.</li> <li>3. Select appropriate ferrous and non-ferrous materials for various applications.</li> <li>4. Identify and select suitable non-metallic materials.</li> <li>5. Identify suitable strengthening mechanisms for Non-ferrous alloys.</li> <li>6. Work with non-destructive testing methods.</li> </ol>
38.	18BEME441	Engineering Materials And Metallurgy (Laboratory)	<ol style="list-style-type: none"> <li>1. Identify the metallurgical aspects of metals.</li> <li>2. Identify suitable heat treatment processes for various applications.</li> <li>3. Select appropriate ferrous and non-ferrous materials for various applications.</li> <li>4. Identify and select suitable non-metallic materials.</li> <li>5. Able to perform corrosion test.</li> <li>6. Able to describe a polymer's elastic behaviour above and below the glass transition.</li> </ol>
39.	18BEME442	Applied Thermodynamics (Theory)	<ol style="list-style-type: none"> <li>1. Calculate the efficiency of various gas power cycles.</li> <li>2. Calculate the performance characteristics of engines.</li> <li>3. Analyze combustion mechanism in IC engines.</li> <li>4. Evaluate the characteristic of steam turbines and nozzles.</li> <li>5. Evaluate the performance characteristics of compressors.</li> <li>6. Identify and utilize the concepts of refrigeration and air conditioning in engineering applications</li> </ol>
40.	18BEME442	Applied Thermodynamics (Laboratory)	<ol style="list-style-type: none"> <li>1. conduct experiment on IC engine to study the characteristic and performance of IC Engine</li> <li>2. conduct experiment to find the thermo physical properties of given fluid.</li> <li>3. Understand the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.</li> <li>4. Can formulate power production based on the fundamental laws of thermal engineering.</li> <li>5. Understand instil upon to envisage appropriate experiments related to heat engines.</li> <li>6. Understand and investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind.</li> </ol>
41.	18BEME443	Strength Of Materials (Theory)	<ol style="list-style-type: none"> <li>1. Determine stress and strain on deformation of solids.</li> <li>2. Draw the shear force and bending moment diagram for various types of beams.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Compute safe working stresses and load carrying capacity of beams.</li> <li>4. Estimate the deflection in beams and columns in engineering applications.</li> <li>5. Determine principal stresses and analyze thin cylinders and shells subjected to pressure forces.</li> <li>6. Analyze the effect of torsion on shafts and springs.</li> </ol>
42.	18BEME443	Strength Of Materials (Laboratory)	<ol style="list-style-type: none"> <li>1. Ability to perform different destructive testing</li> <li>2. Ability to characteristic materials</li> <li>3. Understand the stress and strain relationship.</li> <li>4. Determine the shear force for various materials.</li> <li>5. Determine the impact load for various materials.</li> <li>6. Determine the hardness for various materials</li> </ol>
43.	18BEME444	Fluid Mechanics And Fluid Machines (Theory)	<ol style="list-style-type: none"> <li>1. Determine fluid properties to solve engineering problems.</li> <li>2. Understand the flow characteristics of fluids and its mathematical relations.</li> <li>3. Identify fluid behaviours and perform dimensional analysis for fluid flow.</li> <li>4. Characterize the fluid flow in a fixed boundary.</li> <li>5. Draw velocity vector diagram for hydraulic machines.</li> <li>6. Investigate performances of hydraulic machines.</li> </ol>
44.	18BEME444	Fluid Mechanics And Fluid Machines (Laboratory)	<ol style="list-style-type: none"> <li>1. Calculate the coefficient of discharge for Orifice meter and Venturimeter.</li> <li>2. Calibrate the Rotameter</li> <li>3. Estimate the friction factor for flow through pipes.</li> <li>4. Asses the performance of centrifugal pump and submergible pump.</li> <li>5. Asses the performance of reciprocating pump and gear pump.</li> <li>6. Asses the performance of turbines.</li> </ol>
45.	17BEME601	Operations Research	<ol style="list-style-type: none"> <li>1. Formulate and solve engineering and managerial situations as LPP.</li> <li>2. Solve Engineering and Managerial situations in Transportation.</li> <li>3. Give Engineering and Managerial solutions in Assignment and scheduling problems.</li> <li>4. Manage inventory in industry.</li> <li>5. Select better sequence to perform operation among various alternatives.</li> <li>6. Apply the various tools in various sections of industries like marketing, material handling etc.</li> </ol>
46.	17BEME602	Design Of Transmission System	<ol style="list-style-type: none"> <li>1. Design the power transmission components like belts, pulleys, ropes, chains and sprockets.</li> <li>2. Design spurs and parallel axis helical gears.</li> <li>3. Estimate the dimensions for bevel and worm gears.</li> <li>4. Practice the design procedures of gear boxes for industrial applications.</li> <li>5. Design clutches and brakes for engineering applications.</li> <li>6. Design a mechanical system</li> </ol>

47.	17BEME603	Heat And Mass Transfer	<ol style="list-style-type: none"> <li>1. Determine the rate of heat transfer for conduction.</li> <li>2. Evaluate heat transfer coefficients for natural and forced convection for different fluid flows.</li> <li>3. Analyse performance of heat exchanger.</li> <li>4. Estimate the radiation heat transfer between the surfaces.</li> <li>5. Calculate the coefficient of mass transfer.</li> <li>6. Solve complex problems where heat and mass transfer take place</li> </ol>
48.	17BEME604	Economics For Engineers	<ol style="list-style-type: none"> <li>1. Evaluate the economic theories, cost concepts and pricing policies.</li> <li>2. Understand the market structures and integration concepts</li> <li>3. Understand the measures of national income, the functions of banks and concepts of globalization</li> <li>4. Apply the concepts of financial management for project appraisal</li> <li>5. Understand accounting systems and analyze financial statements using ratio analysis</li> <li>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</li> </ol>
49.	17BEME6E01	Power Plant Engineering	<ol style="list-style-type: none"> <li>1. Select the accessories and layout required for a steam power plant depending upon the requirements.</li> <li>2. Compute performance of steam power plant.</li> <li>3. Explain the working of nuclear and hydel power plant.</li> <li>4. Compute performance of gas turbine power plant.</li> <li>5. Calculate the economics of the power plant.</li> <li>6. Apply appropriate type of renewable energy technologies depending upon the application and availability.</li> </ol>
50.	17BEME6E02	Advanced Manufacturing Processes	<ol style="list-style-type: none"> <li>1. Understand the concepts and processing parameters of powder metallurgy process</li> <li>2. Different kinds of metal joining processes.</li> <li>3. Explain various sheet metal making processes</li> <li>4. Summarize various hot working and cold working methods of metals</li> <li>5. Describe the constructional and operational features of modern machining process</li> <li>6. Understand the importance of rapid prototyping in the product development</li> </ol>

51.	17BEME6E05	Design For Manufacture And Assembly	<ol style="list-style-type: none"> <li>1. Understand the importance of DFMA in industrial scenario</li> <li>2. Implement the tolerances analysis.</li> <li>3. Identify different types of tolerance allocation methods.</li> <li>4. Practice the geometric dimensioning and tolerance concepts.</li> <li>5. Prepare tolerance chart.</li> <li>6. Implement DFM concepts in practice.</li> </ol>
52.	17BEME6E07	Advanced I C Engines	<ol style="list-style-type: none"> <li>1. Explain the construction and operation of internal combustion engine.</li> <li>2. Identify parts, terminology and fuel supply system of internal combustion engine.</li> <li>3. Recognize the component used in cooling and lubrication systems of IC engines.</li> <li>4. Describe the function of combustion, knocking and super charging of internal combustion engines.</li> <li>5. Implement strategies for pollution control.</li> <li>6. Know about the recent trends associated with IC engines</li> </ol>
53.	17BEME611	Computer Aided Design And Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Use computer and CAD software's for modeling of mechanical components</li> <li>2. Use various options in SolidWorks for modeling of given components</li> <li>3. Create assembly of components</li> <li>4. Prepare manufacturing drawings from the models created</li> <li>5. Use MAT Lab for simulating different systems like hydraulic and pneumatic circuits</li> <li>6. Use mat lab for performing various mathematical operations</li> </ol>
54.	17BEME612	Thermal Engineering Laboratory II	<ol style="list-style-type: none"> <li>1. Conduct a test to find thermal conductivity of various engineering materials.</li> <li>2. Measure heat transfer rate in free and forced convection environment.</li> <li>3. Measure emissivity of grey surface.</li> <li>4. Determine Stefan–Boltzmann constant.</li> <li>5. Measure the effectiveness of parallel and counter flow heat exchanger.</li> <li>6. Measure COP of refrigeration and air conditioning system and performance of air compressor and fluidized bed cooling tower.</li> </ol>
55.	17BEME613	Mini Project	<ol style="list-style-type: none"> <li>1. Develop the ability to fabrication skill.</li> <li>2. Ability to make literature review till the successful solution.</li> <li>3. Ability to identify specific problems.</li> <li>4. Gain the knowledge about data collection and conducting experiments.</li> <li>5. Develop the skill to prepare the project reports</li> <li>6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.</li> </ol>
56.	16BEME801	Total Quality Management	<ol style="list-style-type: none"> <li>1. Understand the essentiality of quality.</li> <li>2. Summarize various TQM principles.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Understand the various TQM principles.</li> <li>4. Understand the techniques for quality management.</li> <li>5. Implement standard quality systems in industries.</li> <li>6. Apply various techniques to improve the quality in industries.</li> </ol>
57.	16BEME8E01	Quality Control And Reliability Engineering	<ol style="list-style-type: none"> <li>1. Summarize the concept of Quality</li> <li>2. Apply Process control for variables</li> <li>3. Apply the process control for attributes</li> <li>4. Explain the concept of sampling and to solve problems</li> <li>5. Explain the concept of Life testing</li> <li>6. Explain the concept Reliability and techniques involved</li> </ol>
58.	16BEME8E02	Production Planning And Control	<ol style="list-style-type: none"> <li>1. Indicate the need for planning and control in various aspects.</li> <li>2. Understand various work study methodologies.</li> <li>3. Construct product and process plan.</li> <li>4. Prepare a production schedule based on different facets.</li> <li>5. Estimate the level of inventory</li> <li>6. Understand the recent advancements in production planning and control.</li> </ol>
59.	16BEME8E03	Cogeneration And Waste Heat Recovery Systems	<ol style="list-style-type: none"> <li>1. Understand the various methods of cogeneration.</li> <li>2. Apply knowledge of thermodynamics, heat transfer, and fluid Mechanics principles to design and analysis of this emerging technology.</li> <li>3. Have thorough understanding, operational issues and challenges cogeneration technologies.</li> <li>4. Understand the impact of this technology in waste heat recovery systems</li> <li>5. Get the knowledge over various systems involved in waste heat recovery process</li> <li>6. Begin a career as an engineer in an organization economic analysis</li> </ol>
60.	16BEME891	Project Work - Phase II and Viva – Voce	<ol style="list-style-type: none"> <li>1. Develop the ability to fabrication skill.</li> <li>2. Ability to make literature review till the successful solution.</li> <li>3. Ability to identify specific problems.</li> <li>4. Gain the knowledge about data collection and conducting experiments.</li> <li>5. Develop the skill to prepare the project reports</li> <li>6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.</li> </ol>

## FACULTY OF ARCHITECTURE

Name of the Department : **Faculty of Architecture**

**Course : B. Arch.**

Sl. No.	Course Code	Name of the Course	Course Outcomes
1	19ART101	History Of Architecture I	<ol style="list-style-type: none"> <li>1. An understanding about the spatial and stylistic qualities associated with architecture.</li> <li>2. An understanding of the diversity of architecture in India.</li> <li>3. An understanding to appreciate particular culture, symbolic, spatial and material qualities.</li> <li>4. An understanding about architecture and cities as givers of meaning and continuity.</li> <li>5. An Understanding about the Dravidian Style by case studies.</li> <li>6. An Understanding about the West Asian Architecture by case studies.</li> </ol>
2	19ART102	Mathematics In Architecture	<ol style="list-style-type: none"> <li>1. Student will be trained on the basis of the topics of Mathematics necessary for effective understanding of architecture subjects.</li> <li>2. Students will understand the advanced level applications by using coordinate geometry</li> <li>3. Students will understand the Statistical charts and variance for applications in architecture</li> <li>4. Students will develop the skill and understating of Area &amp; volume calculations for Applications in Architectural design</li> <li>5. Students will understand the historical applications of mathematics and use of it in current context</li> <li>6. Student would have an understanding of the basics of parametric design concept in architecture</li> </ol>
3	19ART103	Environmental Studies	<ol style="list-style-type: none"> <li>1. Student will be able to master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.</li> <li>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.</li> <li>3. Student will know to appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.</li> <li>4. Student will able to relate the environmental studies to the city planning strategies and Architecture</li> <li>5. Student will be able to understand about the biodiversity and the conservation techniques</li> <li>6. Student will be able to know methods to mitigate pollution</li> </ol>
4	19ARP111	Art Appreciation And Model Making	<ol style="list-style-type: none"> <li>1. Student will understand the vocabulary of art and form principles</li> <li>2. Student will understand to appreciate the art forms and analyse and apply the concept in architecture</li> <li>3. Student will gain mastery in sketching, visualizing and expression through manual drawing, sensitized to culture, craft and context.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Student will gain Skill Development in Handling Materials and in Making Products and models.</li> <li>5. Student will gain knowledge about various mediums of presentation</li> <li>6. Student will gain deep understanding about the art Appreciation and essence of the Aesthetic value.</li> </ol>
5	19ARS121	Architectural Design - I	<ol style="list-style-type: none"> <li>1. Student will understand the qualities of different elements as well as their composite fusions.</li> <li>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.</li> <li>3. Student will develop these required skills – observation/analysis/abstractions/interpretation/representations/expressions through models and drawings.</li> <li>4. Student will be able to develop the confidence to communicate effectively by explaining their own design product.</li> <li>5. Student will develop the art of Design Communication through his expression.</li> <li>6. Student will understand with whole design process from the concept to the final product.</li> </ol>
6	19ARS122	Building Materials	<ol style="list-style-type: none"> <li>1. Students will learn about the properties of various building materials</li> <li>2. Students will understand the properties of stone, brick and its usage through drawing</li> <li>3. Student will be able to recognize the apt usage of materials through proper research</li> <li>4. Students will be able to understand and submit drawing plates comprising of technical plan, elevation and section along with sketches and details.</li> <li>5. Student will be able to understand the technical details and construction details of the subject</li> <li>6. Students will gain knowledge in cost and availability by their field Survey and Site visits</li> </ol>
7	19ARS123	Architectural Graphics	<ol style="list-style-type: none"> <li>1. Student will be able to understand the 2 dimensional &amp; the 3 dimensional perspective of the objects</li> <li>2. Student will be able to construct the 3d views and perspective drawings of the buildings.</li> <li>3. Student will be able to draw the perspective drawings with sciography</li> <li>4. Student will be able to do Architectural Rendering</li> <li>5. Student will be able to do architectural detailed drawing for a smaller scale project.</li> <li>6. Student will be able to do read and Do a technical Architectural Drawing</li> </ol>
8	18ART301	History Of Architecture - III	<ol style="list-style-type: none"> <li>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.</li> <li>2. Student will understand about the spatial and stylistic qualities associated with Dravidian architecture.</li> <li>3. Student will understand about the spatial and stylistic qualities associated with Buddhist architecture.</li> <li>4. Student will understand about the spatial and stylistic qualities associated with Islamic architecture</li> </ol>

			<ol style="list-style-type: none"> <li>5. Student will understand the Styles and Details of Mughal Architecture</li> <li>6. Student will expertise in Spatial understanding of historical places by Sketching &amp; reading.</li> </ol>
9	18ART302	Mechanics Of Structures-II	<ol style="list-style-type: none"> <li>1. Student will understand the concepts of action of forces like bending moment and shear force</li> <li>2. Student will understand the basic geometric properties and the behavior of beams under effect of stress</li> <li>3. Student will understand the various structural components of the building like columns</li> <li>4. Student will understand about the Reinforced structures structural system and ability</li> <li>5. Student will understand about Indeterminate Structures in Architectural Design</li> <li>6. Student will be able to relate various building structural components and their behavior</li> </ol>
10	18ARP311	Computer Application-II	<ol style="list-style-type: none"> <li>1. Student will be able to understand the use of digital tools in the realm of visual composition.</li> <li>2. Student will understand the drafting &amp; Details through Software.</li> <li>3. Student will develop the skill of 3D visualization and rendering.</li> <li>4. Student will understand the concept of BIM- building information modelling through the specific software</li> <li>5. Student will gain the Skill of Multimedia &amp; video making presentations required for Architectural practice</li> <li>6. Student will gain knowledge about the latest developments of digital applications in Architecture.</li> </ol>
11	18ARP312	Surveying, Levelling & Site Planning	<ol style="list-style-type: none"> <li>1. Student will understand the various systems of Surveying</li> <li>2. Student understand the concept of levelling and its applications on site for various types of buildings.</li> <li>3. Student will understand about the larger survey context using the total station and GIS mapping</li> <li>4. Student will understand about the Site Inventory and Site analysis</li> <li>5. Student will learn about Hill survey and method of Contouring</li> <li>6. Student will learn about the item planning principles, methods and its applications in architectural design.</li> </ol>
12	18ARS321	Architectural Design-III	<ol style="list-style-type: none"> <li>1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.</li> <li>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</li> <li>3. Student will be able to transform the theoretical ideas to the tangible output of design.</li> <li>4. Student will be able to understand the space organization, space- volume design approach</li> <li>5. Student will be able to research, Analyse and Deliver the Architectural Design.</li> <li>6. Student will be able to Communicate effectively through the design ideas</li> </ol>
13	18ARS322	Building Materials	<ol style="list-style-type: none"> <li>1. Student will learn about the concrete as a versatile material in different contexts.</li> </ol>

		And Constructio n -III	<ol style="list-style-type: none"> <li>2. Student will understand the concepts of concrete as a building construction material.</li> <li>3. Student will be able to design and detail specific components in concrete in Architectural Design</li> <li>4. Student will understand about concrete Footing, column by doing detailed drawings</li> <li>5. Student will understand about concrete Slab, beams by doing detailed drawings</li> <li>6. Student will understand about concrete Plinth, lintel, Sill by doing detailed drawings</li> <li>7. Student will understand about concrete Staircase by doing detailed drawings</li> </ol>
14	18ARS323	Building Services - I	<ol style="list-style-type: none"> <li>1. Student will understand about Building services and its integration in a building</li> <li>2. Student will learn about water supply, sewage, drainage and waste systems in buildings.</li> <li>3. Student will learn about the various electrical systems and applications in building</li> <li>4. Student will understand about Heating, ventilation and air-conditioning systems in a building.</li> <li>5. Student will learn about the Fire safety &amp; Services in a building</li> <li>6. Student will understand the importance of application of services in a building.</li> </ol>
15	17ART501	Contempora ry Architecture -II	<ol style="list-style-type: none"> <li>1. Student will learn about the spread and varied later directions of modern architecture across the world.</li> <li>2. Student will become familiar with contemporary forces and directions in architecture across the world and in India</li> <li>3. Student will understand about the post-independence architecture in India contemporaneous with the rest of the world, along with its own particular influences.</li> <li>4. Student will understand about the Post- independence revolution of design in India</li> <li>5. Student will know about the Alternate practices</li> <li>6. Student will gain knowledge in recent trends of Architecture &amp; Design</li> </ol>
16	17ART502	Design Of Structures-II	<ol style="list-style-type: none"> <li>1. Students will get introduced to the material properties of steel and concrete</li> <li>2. An understanding of the different concepts in designing footings and columns and masonry walls using LSD methods.</li> <li>3. An understanding of the concepts in limit state design</li> <li>4. An understanding of how to use of limit state design for the analysis and design of columns</li> <li>5. An understanding of design of structural elements like footings, retaining walls and masonry walls</li> <li>6. An understanding of how to use limit state design for design of staircases</li> </ol>
17	17ARP511	Computer Application- IV	<ol style="list-style-type: none"> <li>1. Ability to express using digital tools in the realm of visual composition, drafting, 3D visualisation and rendering</li> <li>2. Student will understand the drafting &amp; Details through Software</li> <li>3. Student will develop the skill of 3D visualization and rendering</li> <li>4. Student will understand the concept of BIM- building information modelling through the specific software</li> </ol>

			<ol style="list-style-type: none"> <li>5. Student will gain the Skill of Multimedia &amp; video making presentations required for Architectural practice</li> <li>6. Student will gain knowledge about the latest developments of digital applications in Architecture.</li> </ol>
18	17ARS521	Architectural Design -V	<ol style="list-style-type: none"> <li>1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.</li> <li>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</li> <li>3. Student will be able to transform the theoretical ideas to the tangible output of design.</li> <li>4. Student will be able to understand the space organization, space- volume design approach in large scale projects</li> <li>5. Student will be able to research, Analyse and Deliver a Mixed-use Architectural Design.</li> <li>6. Student will be able to Communicate effectively through the design ideas.</li> </ol>
19	17ARS522	Building Materials And Construction -V	<ol style="list-style-type: none"> <li>1. Student will learn about the Composition, manufacturing method, treatment, properties and uses of glass</li> <li>2. Student will learn about Plastic building products</li> <li>3. Student will learn about Timber floors , build in furnitures , interior details</li> <li>4. Student will gain Knowledge of glass, plastics, paints and finishes in building construction.</li> <li>5. Student will become familiar with Secondary Building products – windows, doors, sky light domes</li> <li>6. Student will gain knowledge about Smart Materials: Characteristics, classification, properties, energy behaviour, intelligent environments.</li> </ol>
20	17ARET531	Landscape Architecture	<ol style="list-style-type: none"> <li>1. Student will understand the role of landscape design with respect to macro scale of sustainability and ecology</li> <li>2. Student will understand the micro scale of shaping of outdoor environments.</li> <li>3. Student will gain Knowledge about the elements of landscape design and their scope.</li> <li>4. Student will know about the Sensitivity towards evolution of different garden and landscape design across time and context.</li> <li>5. Student will understand the historical method of landscape design</li> <li>6. Student will understand the urban scale landscape design.</li> <li>7. Student will be able to do landscape design with respect to site planning and different functional typologies of spaces</li> </ol>
21	17ARET532	Structures In Architecture	<ol style="list-style-type: none"> <li>1. Familiarity with concepts of structural design and its influence on the functional and aesthetic domains of architectural design relating to historic periods.</li> <li>2. Students will gain knowledge about structural systems in pre and post industrial era</li> <li>3. Students will gain familiarity about structural concepts in contemporary period</li> <li>4. Familiarity with the works of famous architects and engineers in the structural front</li> <li>5. Gain knowledge on performing case studies on structurally relevant buildings</li> </ol>

			6. Understanding of architectural expression and its relation to form, structure and changing technology.
22	17ARET53 3	Acoustics	<ol style="list-style-type: none"> <li>1. Student will understand the theoretical concepts of acoustics</li> <li>2. Student will understand the theoretical ideas and concepts sound transmission and absorption</li> <li>3. Student will be able to understand the basics of noise reduction and design applications of noise control</li> <li>4. Student will be able to understand the construction methods for noise control</li> <li>5. Student will understand about basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls, schools, residences</li> <li>6. Student will understand about efficient insulation of fittings and gadgets, machine mounting and insulation of machinery</li> </ol>
23	17ARES53 4	Product Design	<ol style="list-style-type: none"> <li>1. Student will gain knowledge about the various furniture and products</li> <li>2. Student will understand the needs of the industry demand and product value</li> <li>3. Student will gain knowledge in Composite materials and Products</li> <li>4. Student will gain knowledge about Packaging design</li> <li>5. Student will gain knowledge about the House hold items / products</li> <li>6. Student will be able to do a Product design for the client</li> </ol>
24	17ARES53 5	Building Services For Special Buildings	<ol style="list-style-type: none"> <li>1. Student will be able to understand and design high rise buildings with essential services</li> <li>2. Student will gain knowledge in advanced services</li> <li>3. Student will understand about Safety standards for special buildings</li> <li>4. Student will gain knowledge about Fire safety service standards for all types of buildings</li> <li>5. Student will gain knowledge in Building management systems</li> <li>6. Student will gain Knowledge about the integration of services for Multi storied structures</li> </ol>
25	16ARP711	Practical Training - I	<ol style="list-style-type: none"> <li>1. Student will get and overall idea of the nuances of architectural practice.</li> <li>2. Student will understand about the total process that takes place in an Architectural firm</li> <li>3. Student will understand the Specifications of a project, time involved and the execution process</li> <li>4. Student will gain knowledge in architectural working drawings</li> <li>5. Student will gain experience of client meetings &amp; site Execution</li> <li>6. Student will gain the maturity of Architectural design, and the experience gained from internship will be helpful in the thesis project</li> </ol>
26	15ART901	Project Management	<ol style="list-style-type: none"> <li>1. Student will understand a project from concept to commissioning,</li> <li>2. Student will understand the feasibility study &amp; facility programme, design, construction to commissioning.</li> <li>3. Student will be able to apply project management techniques in achieving objectives of a project like client needs, quality, time &amp; cost.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Student will understand about the Project Costing</li> <li>5. Student will understand about the various software of project management.</li> <li>6. Student will gain understanding of principles of management, construction scheduling, scope definition and team roles</li> </ol>
27	15ART902	Urban Design	<ol style="list-style-type: none"> <li>1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.</li> <li>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</li> <li>3. Student will be able to transform the theoretical ideas to the tangible output of design.</li> <li>4. Student will be able to understand the space organization, space- volume design approach in large scale projects</li> <li>5. Student will be able to research, Analyse and Deliver a Urban Design proposal</li> <li>6. Student will be able to Communicate effectively through the design ideas.</li> </ol>
28	15ARS921	Advanced Design – Urban	<ol style="list-style-type: none"> <li>1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.</li> <li>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</li> <li>3. Student will be able to transform the theoretical ideas to the tangible output of design.</li> <li>4. Student will be able to understand the space organization, space- volume design approach in large scale projects</li> <li>5. Student will be able to research, Analyse and Deliver a Urban Design proposal</li> <li>6. Student will be able to Communicate effectively through the design ideas.</li> </ol>
29	15ARS922	Estimation And Costing	<ol style="list-style-type: none"> <li>1. Student will be able to understand and write specification for the given item of work</li> <li>2. Student will gain knowledge &amp; Understanding of Estimation of civil work</li> <li>3. Student will gain knowledge about estimation of Carpentry work</li> <li>4. Student will gain knowledge about estimation of plumbing work</li> <li>5. Student will be able to do calculate the quantities on site with Field measurement book</li> <li>6. Student will learn about various calculation of bill of quantities for Interiors</li> </ol>
30	15ARE931 A	Developmental Rules And Regulations	<ol style="list-style-type: none"> <li>1. Student will be able to read and understand government related documents and incorporate it in practice</li> <li>2. Student will be able to understand the building regulations and follow accordingly</li> <li>3. Student will understand about the legislation of corporation areas</li> <li>4. Student will understand about the legislation of panchayat</li> <li>5. Student will understand about the legislation of Industries</li> </ol>

			6. Student will be able to design buildings as per the recent norms and standards
31	15ARE931 B	Construction Technology	<ol style="list-style-type: none"> <li>1. Ability to understand the practice of construction technology</li> <li>2. Ability to understand the construction systems for high rise buildings</li> <li>3. Ability to understand the process of manufacture, storage and transportation of concrete</li> <li>4. Ability to understand the various equipment used in the construction industry</li> <li>5. Ability to understand the criteria for choice of equipment</li> <li>6. Students will gain an overview of construction management, planning and scheduling.</li> </ol>
32	15ARE931 C	Integrated Building Management System	<ol style="list-style-type: none"> <li>1. Student will be able to understand the practice of safety standards</li> <li>2. Student will gain knowledge in Fire safety standards &amp; practice considerations</li> <li>3. Student will understand about the integrated building management systems</li> <li>4. Student will gain understanding in building automation systems</li> <li>5. Student will become familiar with integrated services for multistoried buildings</li> <li>6. Student will learn about the new concepts of Security and building Management systems</li> </ol>
33	15ARE931 D	Earth Quake Resistance Architecture	<ol style="list-style-type: none"> <li>1. Student will be able to understand the formation and causes of earthquakes</li> <li>2. Student will gain understanding of the factors to be considered in the design of buildings</li> <li>3. Student will understand the services to resist earthquakes.</li> <li>4. Student will become familiar with the Seismic Design Codes &amp; configurations</li> <li>5. Student will understand about designing earth quake resistant structures</li> <li>6. Student will learn about urban level planning strategies for earth quake resistance</li> </ol>
34	15ARE931 E	Digital Architecture	<ol style="list-style-type: none"> <li>1. Student will learn about the Latest digital applications used in the architectural practice</li> <li>2. Student will gain knowledge about parametric applications in design</li> <li>3. Student will learn about the building visualization &amp; Simulation</li> <li>4. Student will learn about Advanced rendering techniques</li> <li>5. Student will learn about animation and visualization techniques used in the architecture industry</li> <li>6. Student will learn about the video presentations and realistic animations of buildings</li> </ol>
35	15ARE931 F	Advanced Concrete Technology	<ol style="list-style-type: none"> <li>1. An understanding of the classification and specifications in concrete</li> <li>2. An understanding of special types of concrete and concreting methods</li> <li>3. An understanding of the Chemical composition and Testing of concrete</li> <li>4. An understanding of properties and durability of concrete</li> <li>5. An understanding of Statistical quality control- sampling and acceptance criteria</li> </ol>

			6. An understanding of the advanced level concrete technological applications
36	15ARE931 G	Real Estate Management	<ol style="list-style-type: none"> <li>1. Student will gain knowledge in the concepts of Real estate development</li> <li>2. Student will understand about Property development</li> <li>3. Student will learn about urban level policies in Real estate management</li> <li>4. Student will learn about the corporate Real estate management</li> <li>5. Student will gain knowledge in Project financing and development</li> <li>6. Student will understand the Current scenario through case studies</li> </ol>
37	19ART201	History Of Architecture II	<ol style="list-style-type: none"> <li>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.</li> <li>2. Student will understand about the spatial and stylistic qualities associated with Buddhist architecture.</li> <li>3. Student will understand about the spatial and stylistic qualities associated with Chalukyan architecture.</li> <li>4. Student will understand about the spatial and stylistic qualities associated with Roman, Romanesque and Gothic architecture</li> <li>5. Student will understand the Styles and Details of Gothic Architecture</li> <li>6. Student will expertise in Spatial understanding of historical places by Sketching &amp; reading</li> </ol>
38	19ART202	Concept Of Building Structures	<ol style="list-style-type: none"> <li>1. Student will understand the concepts of action of forces on a body and should be able to apply the equilibrium concepts.</li> <li>2. Student will understand the basic geometric properties and the behavior of materials under effect of forces</li> <li>3. Student will understand the various structural components of the building and its usage for strength of the structure.</li> <li>4. Student will understand about the Reinforced structures structural system and ability</li> <li>5. Student will understand about Steel Structures in Architectural Design</li> <li>6. Student will relate to various building structural components</li> </ol>
39	19ART203	Theory Of Architecture	<ol style="list-style-type: none"> <li>1. Student will understand on the definition of architecture; elements of architectures of form.</li> <li>2. Student will be exposed to the principles of architecture and applications of the same in buildings and spaces.</li> <li>3. Student will understand the meaning of character and style of buildings with examples.</li> <li>4. Student will understand on ideologies and philosophies of architectures of contemporary</li> <li>5. Student will understand about the theoretical aspects of Architectural Design</li> <li>6. Student will gain Knowledge in the Vocabulary of the Architectural Terms and language</li> </ol>
40	19ARP211	Computer Application - I	<ol style="list-style-type: none"> <li>1. Student will be able to express using digital tools in the realm of visual composition, drafting, 3D visualization and rendering</li> <li>2. Student will be able to draw measured drawings using the software</li> </ol>

			<ol style="list-style-type: none"> <li>3. Student will be able to detail the building components using the software</li> <li>4. Student will be able to produce accurate drawings faster using the software</li> <li>5. Student will be able to give a rendered image of the Architectural Design by software</li> <li>6. Student will be able to conceptualize, visualize and Produce digital drawings at ease</li> </ol>
41	19ARS221	Architectural Design - II	<ol style="list-style-type: none"> <li>1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.</li> <li>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</li> <li>3. Student will be able to transform the theoretical ideas to the tangible output of design.</li> <li>4. Student will be able to understand the space organization, space- volume design approach</li> <li>5. Student will be able to research, Analyse and Deliver a Architectural Design.</li> <li>6. Student will be able to Communicate effectively through the design ideas</li> </ol>
42	19ARS222	Building Materials And Construction - I	<ol style="list-style-type: none"> <li>1. Student will gain Knowledge of properties and construction methods of brick, clay products and timber products.</li> <li>2. Student will be able to detail structural and nonstructural components of simple buildings using the above materials.</li> <li>3. Student will understand to integrate knowledge of properties and construction methods of basic building materials in the design of simple projects.</li> <li>4. Student will understand about the Bamboo construction techniques.</li> <li>5. Student will be able to gain advanced knowledge about Timber Roof Constructions.</li> <li>6. Student will understand the building construction techniques of the traditional / rural houses</li> </ol>
43	19ARS223	Measured Drawing And Documentation	<ol style="list-style-type: none"> <li>1. Student will be able to construct and draw detailed architectural working drawings</li> <li>2. Student will understand the 3d views and perspective drawings of the buildings.</li> <li>3. Student will understand the detailed specifications of a small construction drawing</li> <li>4. Student will learn to Collect the building data and document accordingly</li> <li>5. Student will develop the skill of making an Architectural Working Drawing</li> <li>6. Student will develop skill of reading an Interior working Drawing</li> </ol>
44	18ART401	Climate Responsive Architecture	<ol style="list-style-type: none"> <li>1. Student will understand the whole climatic scenario of the world</li> <li>2. Student will learn about the Solar geometry, sun path its irradiation effects and control</li> <li>3. Student will learn about heat transfer in buildings due to materials and design implications.</li> <li>4. Student will understand about the Various ventilation principles and techniques for good ventilation</li> </ol>

			<ol style="list-style-type: none"> <li>5. Student will understand hybrid design strategies and its design applications for different climatic zones</li> <li>6. Student will develop the skill of doing a climatic design for any building with optimum recommendations.</li> </ol>
45	18ART402	Contemporary Architecture I	<ol style="list-style-type: none"> <li>1. Student will understand the spread and varied later directions of modern architecture across the world.</li> <li>2. Student will understand the architectural production from the 1960s as driven by large scale changes across the world.</li> <li>3. Student will become familiar with contemporary forces and directions in architecture across the world.</li> <li>4. Student will understand the basis of Architecture revolutions and its changes in every decade</li> <li>5. Student will understand the Ideologies of various Architects &amp; their Works</li> <li>6. Student will impart this Knowledge in his Architectural Design</li> </ol>
46	18ART403	Design Of Structures I	<ol style="list-style-type: none"> <li>1. Student will understand about Various Timber sections.</li> <li>2. Student will understand about the design timber beams and columns by applying the code provisions.</li> <li>3. Student will understand about the Steel Sections and its usage.</li> <li>4. Student will be able to design steel joints for maximum efficiency and strength.</li> <li>5. Student will be able to design tension and compression members for different conditions by applying the code provisions.</li> <li>6. Student will be able to design different types of laterally unsupported &amp; supported beams for different conditions.</li> </ol>
47	18ARP411	Computer Application -III	<ol style="list-style-type: none"> <li>1. Student will be able to understand the use of digital tools in the realm of visual composition,</li> <li>2. Student will understand the drafting &amp; Details through Software</li> <li>3. Student will develop the skill of 3D visualization and rendering</li> <li>4. Student will understand the concept of BIM- building information modelling through the specific software</li> <li>5. Student will gain the Skill of Multimedia &amp; video making presentations required for Architectural practice</li> <li>6. Student will gain knowledge about the latest developments of digital applications in Architecture</li> </ol>
48	18ARS421	Architectural Design -IV	<ol style="list-style-type: none"> <li>1. Student will be able collect data, assimilate and integrate knowledge in a holistic manner.</li> <li>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</li> <li>3. Student will learn about traditional techniques and concepts of Architecture.</li> <li>4. Student will learn about the evolution and transformation of the rural settlements according to the time and cultural context.</li> <li>5. Student will understand the essence of rural planning</li> <li>6. Student will develop the skill of design process for the Rural settlements</li> </ol>
49	18ARS422	Building Materials	<ol style="list-style-type: none"> <li>1. Knowledge of properties of ferrous and nonferrous metals as materials for buildings.</li> </ol>

		And Constructio n -IV	<ol style="list-style-type: none"> <li>2. An understanding of possibilities of steel as an important building construction material.</li> <li>3. Ability to design and detail structural and non-structural components of simple buildings using metals.</li> <li>4. Ability to use metal innovatively in building projects.</li> <li>5. Student will gain Knowledge about Steel Floors &amp; Staircase</li> <li>6. Student will understand about the details of Door, windows &amp; Partitions by detailed Drawings.</li> </ol>
50	18ARS423	Building Services -II	<ol style="list-style-type: none"> <li>1. Student will gain Knowledge of design of Water distribution systems in buildings</li> <li>2. Student will learn and understand about the sewerage systems in buildings.</li> <li>3. Student will learn and understand about the plumbing systems</li> <li>4. Student will understand the electrical layout for residential Building</li> <li>5. Student will gain basic knowledge about compressors, evaporators and refrigerant control devices</li> <li>6. Student will understand the Applications of building Services in advanced level by detailed Drawings</li> </ol>
51	17ART601	Building Codes And Regulations	<ol style="list-style-type: none"> <li>1. Student will be able to read and understand government related documents and incorporate it in practice</li> <li>2. Student will be able to understand the building regulations and follow accordingly</li> <li>3. Student will understand about the legislation of corporation areas</li> <li>4. Student will understand about the legislation of panchayat</li> <li>5. Student will understand about the legislation of Industries</li> <li>6. Student will be able to design buildings as per the recent norms and standards</li> </ol>
52	17ART602	Physical Planning	<ol style="list-style-type: none"> <li>1. Student will understand morphology of settlements and their generating forces and characteristics.</li> <li>2. Student will understand the role of planning processes in making positive changes to settlements.</li> <li>3. Student will gain knowledge and awareness of planning interventions with respect to the current world.</li> <li>4. Student will gain understanding about the city evolution process due to planning</li> <li>5. Student will gain Knowledge about existing settlements by Survey studies</li> <li>6. Student will gain vast knowledge about Landsue patterns and planning theories</li> </ol>
53	17ARS621	Architectura l Design VI	<ol style="list-style-type: none"> <li>1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.</li> <li>2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project</li> <li>3. Student will be able to transform the theoretical ideas to the tangible output of design.</li> <li>4. Student will be able to understand the space organization, space- volume design approach in large scale projects</li> <li>5. Student will be able to research, Analyse and Deliver a Campus Design.</li> <li>6. Student will be able to Communicate effectively through the design ideas</li> </ol>

54	17ARS622	Architectural Detailing And Working Drawing	<ol style="list-style-type: none"> <li>1. Student will gain understanding of all the aspects that go into the making of a building through study of drawings related to construction.</li> <li>2. Student will gain the ability to resolve spatial concerns with technical aspects and services of a building.</li> <li>3. Student will understand to design and detail components within a building.</li> <li>4. Student will gain knowledge in interior detailing and planning</li> <li>5. Student will gain knowledge in Interior furniture, fixtures as per the functionality</li> <li>6. Student will gain understanding in the installation methods of cladding, integrated services by means of detailed drawings etc</li> </ol>
55	17ARS623	Sustainable Architecture	<ol style="list-style-type: none"> <li>1. Student will understand about climate change and the need for the sustainable buildings</li> <li>2. Student will understand the energy-based concepts and resource optimisation</li> <li>3. Student will understand about the environmental impacts of today and Follow the Sustainable approach</li> <li>4. Student will gain ability to design energy efficient buildings</li> <li>5. Student will understand the green concepts and apply them in every aspect and approach towards sustainable architecture</li> <li>6. Student will understand about the building simulation for energy analysis and for various design solutions</li> </ol>
56	17ARET631	Vernacular Architecture	<ol style="list-style-type: none"> <li>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.</li> <li>2. Student will gain Knowledge of vernacular architectural forms in different regions.</li> <li>3. Student will gain understanding of the impact of colonial rule on vernacular architecture in India</li> <li>4. Student will understand about the climatic consideration &amp; Design aspects</li> <li>5. Student will understand the socio economic aspects existed in the various regions through the study of vernacular Architecture</li> <li>6. Student will gain knowledge in the vernacular methods of construction and ways to incorporate in this modern architecture.</li> </ol>
57	17ARET632	Progressive Architecture	<ol style="list-style-type: none"> <li>1. Student will be able to understand and evolve futuristic design ideas and concepts</li> <li>2. Student will be able to integrate various aspects of design thinking of future</li> <li>3. Student will understand about the parametric design concepts and applications</li> <li>4. Student will understand about the concept of Biomimicry</li> <li>5. Student will gain knowledge about the Adaptive reuse</li> <li>6. Student will gain knowledge about energy integration and zero energy development.</li> </ol>
58	17ARES633	Interior Design	<ol style="list-style-type: none"> <li>1. Student will gain knowledge and understanding in Interior design</li> <li>2. Student will understand the various elements in Interior Design</li> <li>3. Student will gain knowledge in terms of Interior design lighting and accessories</li> </ol>

			<ol style="list-style-type: none"> <li>4. Student will gain an overall exposure to the ways in which interior spaces can be enriched through the design of specific interior components.</li> <li>5. Student will be able to do specification for an Interior Design layout</li> <li>6. Student will be able to design a Interior project with all working drawing</li> </ol>
59	17ARES63 4	Digital Architecture	<ol style="list-style-type: none"> <li>1. Student will learn about the Latest digital applications used in the architectural practice</li> <li>2. Student will gain knowledge about parametric applications in design</li> <li>3. Student will learn about the building visualization &amp; Simulation</li> <li>4. Student will learn about Advanced rendering techniques</li> <li>5. Student will learn about animation and visualization techniques used in the architecture industry</li> <li>6. Student will learn about the video presentations and realistic animations of buildings</li> </ol>
60	16ARP811	Practical Training - II	<ol style="list-style-type: none"> <li>1. Student will get and overall idea of the nuances of architectural practice.</li> <li>2. Student will understand about the total process that takes place in an Architectural firm</li> <li>3. Student will understand the Specifications of a project, time involved and the execution process</li> <li>4. Student will gain knowledge in architectural working drawings</li> <li>5. Student will gain experience of client meetings &amp; site Execution</li> <li>6. Student will gain the maturity of Architectural design, and the experience gained from internship will be helpful in the thesis project</li> </ol>
61	16ARP821	Dissertation	<ol style="list-style-type: none"> <li>1. Student will learn to research on a specific interested topic and collect appropriate data</li> <li>2. Student will develop the skill of analytical approach towards the related topic</li> <li>3. Student will be able to develop a coherent line of thought based on point of view,</li> <li>4. Student will be able to do observation, analysis and study</li> <li>5. Student will be able to prepare a dissertation report which is based on accepted norms of technical writing.</li> <li>6. Student will become prepared for the larger thesis project.</li> </ol>
62	15ARS102 1	Architectura l Thesis	<ol style="list-style-type: none"> <li>1. Student will gain an overall understanding of an Architectural project</li> <li>2. Student will be able to research, Analyse, synthesize and present his ideas</li> <li>3. Student will apply his skills developed in the previous years in this Project</li> <li>4. Student will gain the ability to handle major architectural project of a larger scale</li> <li>5. Student will be able to design with all Socio, economic and Environmental aspects.</li> <li>6. Student will become an expertise in his domain of architectural design</li> </ol>
63	15ARS103 1A	Industrial Architecture	<ol style="list-style-type: none"> <li>1. Student will understand the application of Industrial buildings</li> </ol>

			<ol style="list-style-type: none"> <li>2. Student will gain understanding about the pre fabrication systems</li> <li>3. Student will gain Knowledge in Industrial construction</li> <li>4. Student will understand about the modular components &amp; coordination of Industrial Buildings</li> <li>5. Student will understand about the overall structural system of Industrial buildings</li> <li>6. Student will be able to design large scale Industrial buildings</li> </ol>
64	15ARS103 1B	Green Building	<ol style="list-style-type: none"> <li>1. Student will understand the basic concept of sustainability in Architecture</li> <li>2. Student will gain knowledge in passive and Hybrid design strategies for designing a green building</li> <li>3. Student will understand the energy usage of various types of buildings</li> <li>4. Student will learn about energy efficiency and ways to minimize the energy.</li> <li>5. Student will learn about the environmental impacts and assessment</li> <li>6. Student will gain knowledge about the green rating systems and codes in India</li> </ol>
65	15ARS103 1C	Research Methods	<ol style="list-style-type: none"> <li>1. Student will understand the research methodology and research methods</li> <li>2. Student will understand the various analytical methods</li> <li>3. Student will understand the experimental methods of Research</li> <li>4. Student will learn about the survey methods and documentation</li> <li>5. Student will know to collect relevant data, compile and document</li> <li>6. Student will be able to critically analyse the data and present it as a document</li> </ol>
66	15ARS103 1D	Medical Architecture	<ol style="list-style-type: none"> <li>1. Student will understand the important fields of health care industry</li> <li>2. Student will understand the standards to be followed in Health care industry in accordance to architecture</li> <li>3. Student will understand the services involved in the health care industry</li> <li>4. Student will learn about the survey methods and documentation</li> <li>5. Student will know about the various delivery systems and operations involved in health care industry</li> <li>6. Student will be able to design for a health care sector with green concepts and with environmental quality</li> </ol>
67	15ARS103 1E	Exhibition Design	<ol style="list-style-type: none"> <li>1. An understanding of the Exhibition design</li> <li>2. An understanding of the retail Architecture</li> <li>3. An understanding of the major services in exhibition design</li> <li>4. An understanding of planning aspects of the Exhibition Design</li> <li>5. An understanding of the marketing theories &amp; retail branding techniques</li> <li>6. An understanding of the advanced level of Exhibition Structures</li> </ol>
68	15ARS103 1F	Progressive Architecture	<ol style="list-style-type: none"> <li>1. Student will be able to understand and evolve futuristic design ideas and concepts</li> </ol>

			<ol style="list-style-type: none"> <li>2. Student will be able to integrate various aspects of design thinking of future</li> <li>3. Student will understand about the parametric design concepts and applications</li> <li>4. Student will understand about the concept of Biomimicry</li> <li>5. Student will gain knowledge about the Adaptive reuse</li> <li>6. Student will gain knowledge about energy integration and zero energy development.</li> </ol>
69	15ARS103 1G	HGH Rise Buildings	<ol style="list-style-type: none"> <li>1. Student will learn about the Design and planning aspects of High-rise structures</li> <li>2. Student will gain knowledge about the National building Codes of high-rise structures</li> <li>3. Student will understand about the various development control regulations all over India</li> <li>4. Student will gain knowledge about the Structural aspects of High-Rise buildings</li> <li>5. Student will gain knowledge about various technical services involved in High rise buildings</li> <li>6. Student will gain knowledge about functionality of the high-rise structures</li> </ol>

Name of the Department : **Faculty of Architecture**

Course : M. Arch.

Sl. No.	Course Code	Name of the Course	Course Outcomes
1	18MARS311	Dissertation - I	<ol style="list-style-type: none"> <li>1. Student will be able to identify the thrust area of research</li> <li>2. Student will understand and develop his own dissertation topic with research -oriented study</li> <li>3. Student will know the basis of experimentation, methods and applications</li> <li>4. Student will understand the core ideas of Application design through the experimental research</li> <li>5. Student will be able to analyse and synthesize a defined context with in-depth study and scientific approach</li> <li>6. Student will be able to provide innovative and practical solutions for the future architecture.</li> </ol>
2	18MARESS4	Sustainable Building Systems	<ol style="list-style-type: none"> <li>1. Student will be able to gain knowledge and application of low energy building design</li> <li>2. Student will understand the thermal quality standards and its importance in various countries</li> <li>3. Student will understand the use of green materials and products for a sustainable future.</li> <li>4. Student will be able to calculate the energy consumption features and the cost audits.</li> <li>5. Student will be able to understand the integrated building management systems for a controlled environment.</li> <li>6. Student will be able to understand the energy and cost audits</li> </ol>
3	18MARESS5	Sustainable Trends And Theories	<ol style="list-style-type: none"> <li>1. Student will be able to understand the policy level mechanisms and design process and product accordingly.</li> <li>2. Student will understand the vernacular/traditional building types and its applications to the modern context by its systems and materials.</li> <li>3. Student will understand to use the site in an optimum manner and know about the operational and maintenance practices.</li> <li>4. Student will gain knowledge about biomimicry and its importance in sustainable design</li> <li>5. Student will gain knowledge about futuristic design systems and new material applications.</li> <li>6. Student will Understand about the Adaptive Reuse &amp; urban Generation</li> </ol>
4	18MARESH4	Community Participation In Housing	<ol style="list-style-type: none"> <li>1. Student will be able to develop a model for both the end user and the service provider</li> <li>2. Student will be able to involve in planning in design stages</li> <li>3. Student will be able to understand the intricacies of Community participation in Housing</li> </ol>

			<ol style="list-style-type: none"> <li>4. Student will be able to give design solution for the future community housing</li> <li>5. Student will gain Knowledge about the best practices in Community housing</li> <li>6. Student will know about various typologies of community housing</li> </ol>
5	18MARESH5	Special Types Of Housing	<ol style="list-style-type: none"> <li>1. Student will learn and understand the Vernacular Architecture of various regions of world</li> <li>2. Student will learn and understand the Vernacular Architecture of various regions of India</li> <li>3. Student will learn and understand the Vernacular Architecture of various regions of Tamilnadu</li> <li>4. Student will learn about design aspects and historical methods of construction which can be adopted for a particular context</li> <li>5. Student will learn and understand the types of housing in disaster prone areas</li> <li>6. Student will be able to Propose the housing trend for the Future</li> </ol>
6	19MARS111	Research Methodology - I	<ol style="list-style-type: none"> <li>1. Student will understand the methods of research</li> <li>2. Student will be able to develop the Skill of field study and experimentation</li> <li>3. Student will understand the research application in the field of Architectural Design</li> <li>4. Student will understand about the collection of data and Analyse the data</li> <li>5. Student will develop the skill of documentation of various Survey and Research</li> <li>6. Student will be able to prepare documents, report writing and publish in journals</li> </ol>
7	19MARS112	Design Systems	<ol style="list-style-type: none"> <li>1. Student will be able to understand the various design systems in the Architecture era</li> <li>2. Student will be able to understand the vernacular architecture and its importance</li> <li>3. Student will Understand the contemporary design process</li> <li>4. Student will develop the skill of Design thinking as per the Current situation</li> <li>5. Student will develop the skill of presentation of his ides by Seminar and presentation</li> <li>6. Student will be able to envision the futuristic architecture</li> </ol>
8	19MARS113	Design Research And Field Studies	<ol style="list-style-type: none"> <li>1. Student will be able to collect data and information as per the context</li> <li>2. Student will understand the methods of Field Survey</li> <li>3. Student will understand the method of collection and compilation of Data of Survey &amp; Field Study</li> <li>4. Student will be able to format all the data into types and to prepare and publish</li> <li>5. Student will be able to critically find solutions with the analytical skills of research</li> <li>6. Student will develop the Skill of Report Writing</li> </ol>

9	19MARS114	Advanced Design Studio - I	<ol style="list-style-type: none"> <li>1. Student will be able to design complex structures with advanced level planning principles</li> <li>2. Student will be able to understand the Urban Renewal and urban level design</li> <li>3. Student will be able to Design large scale projects</li> <li>4. Student will understand the Physiological and Psychological aspects in advanced level of Design</li> <li>5. Student will be able to give a wholesome product of design in all aspects</li> <li>6. Student can give futuristic proposals for the urban Architecture</li> </ol>
10	19MARESS1	Introduction To Sustainable Architecture	<ol style="list-style-type: none"> <li>1. Student will understand the fundamentals of sustainable concepts and applications</li> <li>2. Student will understand the Site planning principles and its applications</li> <li>3. Student will understand the climate and its impacts in indoor thermal comfort</li> <li>4. Student will understand the energy usage ratio and the effective steps of conservation and utilization of energy.</li> <li>5. Student will understand the Green building Rating Systems in a Broader context</li> <li>6. Student will understand the Effective methods to propose green buildings through Case Studies</li> </ol>
11	19MARESH1	Introduction To Housing Design	<ol style="list-style-type: none"> <li>1. Student will be able to gain knowledge about housing typologies</li> <li>2. Student will understand about the theories and concepts of community and Neighbourhood</li> <li>3. Student will understand about the emerging trends in housing</li> <li>4. Student will understand about the housing finance schemes and management</li> <li>5. Student will understand the relation of housing and real estate management in the global and local scenario.</li> <li>6. Student will Understand the Basis of Housing Demand all over the world</li> </ol>
12	18MARS411	Dissertation-II	<ol style="list-style-type: none"> <li>1. Student will be able to identify the thrust area of research</li> <li>2. Student will understand and develop his own dissertation topic with research -oriented study</li> <li>3. Student will know the basis of experimentation, methods and applications</li> <li>4. Student will understand the core ideas of Application design through the experimental research</li> <li>5. Student will be able to analyse and synthesize a defined context with in-depth study and scientific approach</li> <li>6. Student will be able to provide innovative and practical solutions for the future architecture by Design</li> </ol>

13	19MARS211	Research Methodology - II	<ol style="list-style-type: none"> <li>1. Student will understand the methods of research</li> <li>2. Student will be able to develop the Skill of field study and experimentation</li> <li>3. Student will understand the research application in the field of Architectural Design</li> <li>4. Student will understand about the collection of data and Analyse the data</li> <li>5. Student will develop the skill of documentation of various Survey and Research</li> <li>6. Student will be able to prepare documents, report writing and publish in journals</li> </ol>
14	19MARS212	Documentation And Presentation	<ol style="list-style-type: none"> <li>1. Student will be able to review the literature and analyse every aspect of the study</li> <li>2. Student will understand the importance and method of Experimentation.</li> <li>3. Student will be able to organize formal seminars</li> <li>4. Student will be able to present with technical ideas and analysis</li> <li>5. Student will be able to do paper presentation in journals, magazines and write review.</li> <li>6. Student will be able to make a good frame work of his Dissertation / Thesis</li> </ol>
15	19MARS213	Advanced Design Studio - II	<ol style="list-style-type: none"> <li>1. Student will be able to design complex structures with advanced level planning principles</li> <li>2. Student will be able to understand &amp; design as per the Sustainability aspects</li> <li>3. Student will be able to Design large scale projects</li> <li>4. Student will understand the Physiological and Psychological aspects in advanced level of Design</li> <li>5. Student will be able to give a wholesome product of design in all aspects</li> <li>6. Student can give futuristic proposals for the urban Architecture.</li> </ol>
16	19MARESS2	Building Performance Analysis	<ol style="list-style-type: none"> <li>1. Student will understand the effects of indoor comfort through software simulation and analysis</li> <li>2. Student will be able to achieve a quantitative result of thermal analysis by software simulations</li> <li>3. Student will be able to effectively use the modelling tools and techniques</li> <li>4. Student will be able to design a building with good thermal comfort with optimum design solutions</li> <li>5. Student will be able to give quantitative results of Daylighting and Ventilation of a building</li> <li>6. Student will be able to give an energy performance index of a building.</li> </ol>
17	19MARESS3	Sustainable Design Strategies	<ol style="list-style-type: none"> <li>1. Student will be able to apply the Sustainable design strategies in architecture, Design and environment</li> <li>2. Student will be able to give design solutions of</li> </ol>

			<p>Thermal comfort for various climatic locations</p> <ol style="list-style-type: none"> <li>3. Student will understand the application of Passive, Active and Hybrid Design strategies.</li> <li>4. Student will become expertise in terms of green building aspects and applications.</li> <li>5. Student will understand the in – depth Analysis of Daylighting</li> <li>6. Student will understand the In- depth analysis of Ventilation technique</li> </ol>
18	19MARESH2	Housing Policies And Schemes	<ol style="list-style-type: none"> <li>1. Student will learn and gain knowledge the housing schemes and policies</li> <li>2. Student will gain knowledge about the urban housing scenario</li> <li>3. Student will gain knowledge about the rural housing scenario</li> <li>4. Student will gain knowledge about the stakeholders in the housing</li> <li>5. Student will gain knowledge about the systematic approach for the future housing demand.</li> <li>6. Student will gain knowledge about the Schemes of Central &amp; State government</li> </ol>
19	19MARESH3	Sustainable Housing	<ol style="list-style-type: none"> <li>1. Student will be able to understand the sustainable site planning with site inventory and analysis</li> <li>2. Student will understand about Affordable housing techniques</li> <li>3. Student will learn about cost effective techniques in housing.</li> <li>4. Student will be able to understand the resource mapping</li> <li>5. Student will be able to understand the advance level building services</li> <li>6. Student will be able to understand &amp; design high performance houses</li> </ol>

## FACULTY OF PHARMACY

Name of the Department: **Faculty of Pharmacy**

**Course:** B. Pharm

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19BP101T	Human Anatomy and Physiology – I Theory	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Explain the gross morphology, structure and functions of various organs of the human body.</li><li>2. Describe the various homeostatic mechanisms and their imbalances.</li><li>3. Identify the various tissues and organs of different systems of human body.</li><li>4. Illustrate the body fluids coagulation, blood grouping, Rh factors and disorders of blood.</li><li>5. Appreciate coordinated working pattern of different organs of each system.</li><li>6. Explain all the bones, Joints and their functions in the human body.</li></ol>
2.	19BP102T	Pharmaceutical Analysis Theory	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Understand the basic concepts and Pharmacopeial standards of pharmaceutical analysis.</li><li>2. Identify the errors in analysis.</li><li>3. Understand the principles of volumetric analysis.</li><li>4. Understand the principles of electrochemical analysis.</li><li>5. Applications of volumetric analysis.</li><li>6. Applications of electrochemical analysis.</li></ol>
3.	19BP103T	Pharmaceutics Theory	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Understand the history of profession of pharmacy.</li><li>2. Understand the basics of different dosage forms.</li><li>3. Understand the professional way of handling the prescription.</li><li>4. Prepare various conventional dosage forms.</li><li>5. Develop a clear idea about Pharmaceutical incompatibility and different pharmaceutical calculations in pharmacy.</li><li>6. Predict the instability problems in semi sold dosage forms.</li></ol>
4.	19BP104T	Pharmaceutical Inorganic Chemistry Theory	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Understand the sources of impurities.</li><li>2. Explain the methods to determine the impurities in inorganic drugs and pharmaceuticals.</li><li>3. Explain the medicinal and pharmaceutical importance of buffers, electrolytes and dental products.</li><li>4. Describe the medicinal and pharmaceutical importance of gastrointestinal agents.</li><li>5. Discuss the medicinal and pharmaceutical importance of expectorants, hematinics, emetics, antidotes and astringents.</li></ol>

			6. Elaborate the medicinal and pharmaceutical importance of Radiopharmaceuticals.
5.	19BP105T	Communication skills Theory	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation.</li> <li>2. Communicate effectively (Verbal and Non-Verbal).</li> <li>3. Effectively manage the team as a team player.</li> <li>4. Develop interview skills.</li> <li>5. Develop Leadership qualities and essentials.</li> <li>6. Develop presentation and group discussion skills.</li> </ol>
6.	19BP106RBT	Remedial Biology Theory	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Explain the classification and salient features of five kingdoms of life and morphology of flowering plants.</li> <li>2. Describe the circulatory, digestive and respiratory systems.</li> <li>3. Discuss the Nervous, Excretory and reproductive systems.</li> <li>4. Understand the photosynthesis and plant and mineral nutrition.</li> <li>5. Discuss the respiration, growth of plants</li> <li>6. Elaborate the cell and tissues of plant and animal.</li> </ol>
7.	19BP106RMT	Remedial Mathematics Theory	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Understand the partial fraction, logarithms, function and limits.</li> <li>2. Perform calculations using matrices and determinants.</li> <li>3. Solve problems using differential and integral calculus.</li> <li>4. Calculate the equation for straight line and coordinates.</li> <li>5. Apply differential equations and Laplace transformation for solving problems.</li> <li>6. Appreciate the important application of mathematics in Pharmacy.</li> </ol>
8.	19BP107P	Human Anatomy and Physiology – I Practical	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Identify epithelial, connective tissue, muscular, nervous tissues microscopically and the axial, appendicular bones.</li> <li>2. Determine the bleeding time, clotting time.</li> <li>3. Record the heart rate, pulse rate, blood pressure.</li> <li>4. Demonstrate the WBC count and RBC count Identify the axial, appendicular bones.</li> <li>5. Estimate the blood group and erythrocyte sedimentation rate.</li> <li>6. Demonstrate the living tissue, intact animals or normal human beings.</li> </ol>
9.	19BP108P	Pharmaceutical Analysis Practical	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Analyze the limit test for samples.</li> <li>2. Prepare the solutions for volumetric and electro-analytical methods.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Standardize the solutions by volumetric and electro-analytical methods.</li> <li>4. Perform the assay for chemical substances.</li> <li>5. Standardize the titrant used for the assay.</li> <li>6. Determine the strength of the solutions by electro-analytical methods.</li> </ol>
10.	19BP109P	Pharmaceutics Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the professional way of preparing a prescription.</li> <li>2. Prepare various liquid dosage forms.</li> <li>3. Prepare various solid dosage forms.</li> <li>4. Prepare various semi solid dosage forms.</li> <li>5. Perform quality control tests for various dosage forms.</li> <li>6. Acquire the knowledge of using equipment's in pharmaceutical industry.</li> </ol>
11.	19BP110P	Pharmaceutical Inorganic Chemistry Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Perform Limit test for ions.</li> <li>2. Perform Limit test for metals.</li> <li>3. Identify inorganic pharmaceuticals.</li> <li>4. Test the inorganic sample for its purity.</li> <li>5. Determine the physical properties of inorganic pharmaceuticals.</li> <li>6. Prepare inorganic pharmaceuticals.</li> </ol>
12.	19BP111P	Communication skills Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Communicate effectively to meet the people, ask question and make friends.</li> <li>2. Understand the do's and don'ts of effective communication.</li> <li>3. Pronounce the sounds effectively.</li> <li>4. Explain the figures of speech and direct/indirect speech.</li> <li>5. Write effectively mails and other written communications.</li> <li>6. Present a topic in a gathering.</li> </ol>
13.	19BP112RBP	Remedial Biology Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the microscope, cutting sections, mount, stain and slide preparation.</li> <li>2. Study cell and its organelles.</li> <li>3. Study the parts of plant and their modifications.</li> <li>4. Study the system in from using software.</li> <li>5. Identify types of bones.</li> <li>6. Determine blood group, blood pressure and tidal volume.</li> </ol>
14.	19BP201T	Human Anatomy and Physiology – II Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the gross morphology, structure and functions of various organs of the human body.</li> <li>2. Describe the various homeostatic mechanisms and their imbalances.</li> <li>3. Identify the various tissues and organs of different systems of human body.</li> <li>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.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Appreciate coordinated working pattern of different organs of each system.</li> <li>6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.</li> </ol>
15.	19BP202T	Pharmaceutical Organic Chemistry – I Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the classification and nomenclature of organic compounds, and the concepts of isomerism.</li> <li>2. Write the structure, name and the type of isomerism of the organic compound.</li> <li>3. Schematize the reaction/reaction mechanism and name the reaction</li> <li>4. Explain the orientation of reactions.</li> <li>5. Account for reactivity/stability of compounds.</li> <li>6. Identify/confirm the organic compounds.</li> </ol>
16.	19BP203T	Biochemistry Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the types and importance of biomolecules.</li> <li>2. Explain the bioenergetics and energy rich compounds.</li> <li>3. Understand the metabolism of nutrient molecules in physiological and pathological conditions.</li> <li>4. Elaborate the biological oxidation emphasizing electron transport chain and oxidative phosphorylation.</li> <li>5. Describe the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.</li> <li>6. Discuss the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.</li> </ol>
17.	19BP204T	Pathophysiology Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the description about the types of system and related disorders.</li> <li>2. Name the signs and symptoms of the diseases.</li> <li>3. Mention the complications of the diseases.</li> <li>4. Describe the mechanism of the diseases.</li> <li>5. Understand the etiology and pathogenesis of diseases.</li> <li>6. Discuss about the Sexually transmitted diseases.</li> </ol>
18.	19BP205T	Computer Applications in Pharmacy Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Describe the various types of application of computers in pharmacy.</li> <li>2. Understand the various types of databases.</li> <li>3. Discuss the applications of databases in pharmacy.</li> <li>4. Understand the concept of bioinformatics.</li> <li>5. Explain the data analysis in Preclinical development.</li> <li>6. Elaborate the applications of bioinformatics in Vaccine Discovery.</li> </ol>
19.	19BP206T	Environmental sciences Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Create awareness about environmental problems among learners.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Impart basic knowledge about the environment and its allied problems.</li> <li>3. Develop an attitude of concern for the environment.</li> <li>4. Motivate learner to participate in environment protection and environment improvement.</li> <li>5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.</li> <li>6. Strive to attain harmony with Nature.</li> </ol>
20.	19BP207P	Human Anatomy and Physiology – II Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Identify nervous system, endocrine system, digestive, respiratory with the help of specimens, charts and models.</li> <li>2. Identify the cardiovascular systems, urinary and reproductive systems with the help of specimens, charts and models.</li> <li>3. Demonstrate the function of olfactory nerve, visual acuity, reflex activity, and different types of taste.</li> <li>4. Determine the tidal volume, vital capacity and total blood count by cell analyzer.</li> <li>5. Record the body temperature, basal mass index.</li> <li>6. Demonstrate positive and negative feedback mechanism.</li> </ol>
21.	19BP208P	Pharmaceutical Organic Chemistry – I Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Systematically perform qualitative analysis of unknown organic compounds.</li> <li>2. Detect special elements in an organic sample.</li> <li>3. Confirm unknown compounds by m.p./ b.p.</li> <li>4. Prepare derivatives of organic compounds.</li> <li>5. Prepare the solid derivatives from organic compounds.</li> <li>6. Construct molecular models.</li> </ol>
22.	19BP209P	Biochemistry Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Qualitatively analyze the biomolecules.</li> <li>2. Quantitatively analyze biochemical parameters and their importance in diagnosis of disease.</li> <li>3. Systematically analyse the urine for abnormal constituents.</li> <li>4. Identify the biomolecules using chemical tests.</li> <li>5. Determine the enzymatic activity.</li> <li>6. Study the effect of physical parameters on the enzymatic activity.</li> </ol>
23.	19BP210P	Computer Applications in Pharmacy Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Describe the various types of application of computers in pharmacy.</li> <li>2. Understand the various types of databases.</li> <li>3. Information about online tools for drug interaction.</li> <li>4. Work in MS Office.</li> <li>5. Create database for patients.</li> <li>6. Explain Drug information storage and retrieval using MS Access.</li> </ol>
24.	18BP301T	Pharmaceutical Organic Chemistry – II Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Account for the structure, stability, orientation, reaction and its mechanism of Benzene.</li> </ol>

			<ol style="list-style-type: none"> <li>2. Understand the acidic/basic properties, qualitative tests, structure and uses of Phenols, Aromatic amines, Aromatic acids and its derivatives.</li> <li>3. Explain the effect of substituents on acidity and basicity of phenols, aromatic acids and aromatic amines.</li> <li>4. Describe the Definition/difference, properties and analytical constants pertaining to Fats and Oils.</li> <li>5. Emphasize the synthesis, reactions and uses of Polynuclear hydrocarbons and its derivatives.</li> <li>6. Explain the synthesis, reactions and stability of cycloalkanes.</li> </ol>
25.	18BP302T	Physical Pharmaceutics – I Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand various physicochemical properties of drug molecules in the design of dosage forms.</li> <li>2. Know the principles of chemical kinetics &amp; to use them for stability testing and determination of expiry date of formulations.</li> <li>3. Develop a clear idea about solubilisation and techniques for identifying the phenomenon.</li> <li>4. Discover the term complexation and protein binding and its effect in the formulation of new dosage forms.</li> <li>5. Identify the importance of pH and buffers in pharmaceutical systems.</li> <li>6. Achieve a better insight into various areas of formulation, research and development.</li> </ol>
26.	18BP303T	Pharmaceutical Microbiology Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand methods of identification, cultivation and preservation of various microorganisms.</li> <li>2. To understand the importance and implementation of sterilization in pharmaceutical processing and Industry.</li> <li>3. Learn sterility testing of pharmaceutical products.</li> <li>4. Carry out microbiological standardization of Pharmaceuticals.</li> <li>5. Understand the cell culture technology and its applications in pharmaceutical industries.</li> <li>6. Develop knowledge on different types of microscopes in pharmaceutical industry.</li> </ol>
27.	18BP304T	Pharmaceutical Engineering Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know various unit operations used in Pharmaceutical industries.</li> <li>2. Understand the material handling techniques.</li> <li>3. Perform various processes involved in pharmaceutical manufacturing process.</li> <li>4. Appreciate and comprehend significance of plant lay out design for optimum use of resources.</li> <li>5. Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.</li> <li>6. Execute various tests to prevent environmental pollution.</li> </ol>
28.	18BP305P	Pharmaceutical Organic Chemistry –II Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Demonstrate recrystallization and its applications.</li> <li>2. Demonstrate steam distillation and its applications.</li> </ol>

			<ol style="list-style-type: none"> <li>3. Determine the qualitative parameters of oil.</li> <li>4. Prepare few compounds using basic chemical reactions.</li> <li>5. Synthesize organic compounds using named reactions.</li> <li>6. Understand the use and application of synthesized organic compounds.</li> </ol>
29.	18BP306P	Physical Pharmaceutics – I Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the physicochemical parameters of a drug.</li> <li>2. Identify methods to enhance solubility of a new drug moiety</li> <li>3. Discover the importance of stability in pharmaceutical preparations.</li> <li>4. Build practical skills for new drug development process.</li> <li>5. Determine the physicochemical parameters.</li> <li>6. Determine the physical constants of a drug.</li> </ol>
30.	18BP307P	Pharmaceutical Microbiology Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Discuss about the instruments used in experimental microbiology.</li> <li>2. Understand the sterilization methods followed in laboratory.</li> <li>3. Discover the staining techniques used in microbiology.</li> <li>4. Carry out assay of different antibiotics.</li> <li>5. Understand the mechanism of action of antibiotics.</li> <li>6. Execute different sterility tests and bacteriological analysis of water.</li> </ol>
31.	18BP308P	Pharmaceutical Engineering Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand different methods like moisture content, drying curve.</li> <li>2. Identify different techniques like filtration, size reduction, crystallization.</li> <li>3. Know about distillation and steps to be followed in steam distillation.</li> <li>4. Summarize different instruments handled for engineering operations.</li> <li>5. Determine the physical constants for a formulation.</li> <li>6. Demonstrate the various machines used in pharmaceutical industry.</li> </ol>
32.	18BP401T	Pharmaceutical Organic Chemistry – III Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions.</li> <li>2. Discuss heterocyclic compounds based on nomenclature, classification, synthesis and reactions.</li> <li>3. Understand the methods of preparation organic compounds.</li> <li>4. Understand the properties of organic compounds.</li> <li>5. Know the medicinal uses and other applications of organic compounds.</li> <li>6. Elaborate the reactions of synthetic importance.</li> </ol>

33.	18BP402T	Medicinal Chemistry – I Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the drug metabolic pathways.</li> <li>2. State the chemistry of drugs with respect to their biological activity.</li> <li>3. Explain the Classification, Synthesis, therapeutic value and Structural activity relationship of adrenergic agonist and antagonist drugs.</li> <li>4. Describe the Classification, therapeutic value and chemistry of cholinergic agonist and antagonist drugs.</li> <li>5. Brief the Classification, Synthesis, therapeutic value and Structural activity relationship of drugs acting on Central nervous system particularly sedatives, hypnotics, antipsychotics and anticonvulsants.</li> <li>6. Enlight the Classification, and chemical aspects including structural activity relationship of drugs acting on Central nervous system particularly general anesthetics and analgesics.</li> </ol>
34.	18BP403T	Physical Pharmaceutics – II Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand various physicochemical properties of drug molecules in the designing the dosage forms.</li> <li>2. Demonstrate the principles of chemical kinetics &amp; to use them for stability testing and determination of expiry date of formulations.</li> <li>3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.</li> <li>4. Understand the stability enhancement techniques in pharmaceutical industry.</li> <li>5. Discover the importance of accelerated stability testing in new drug formulation.</li> <li>6. Achieve a better insight into various areas of formulation, research and development.</li> </ol>
35.	18BP404T	Pharmacology – I Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. Illustrate the Adverse drug reactions, Drug interactions, Pharmacovigilance and Drug discovery cycle.</li> <li>4. Demonstrate the Organization, function of ANS, classification of neurotransmitters and the drugs acting on it.</li> <li>5. Summarize the Pharmacology of drugs acting on various CNS diseases.</li> <li>6. Describe the Local anesthetic agents and the drugs used in myasthenia gravis, glaucoma.</li> </ol>

36.	18BP405T	Pharmacognosy and Phytochemistry – I Theory	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Understand the history, scope and development of Pharmacognosy.</li> <li>2. Explain the classification of crude drugs, Quality control of Drugs of Natural Origin, Quantitative microscopy of crude drugs.</li> <li>3. Elaborate the techniques in the cultivation and production of crude drugs.</li> <li>4. Demonstrate the plant tissue culture.</li> <li>5. Understand the traditional system of medicine.</li> <li>6. Explain the Plant Products Primary metabolites Proteins, Enzymes, Lipids, Marine drugs.</li> </ol>
37.	18BP406P	Medicinal Chemistry – I Practical	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Synthesize few drugs and their intermediates.</li> <li>2. Synthesize drug intermediates.</li> <li>3. Synthesize some basic nucleus of drug candidates.</li> <li>4. Estimate the purity of drugs.</li> <li>5. Estimate the quantity of drugs present in tablet.</li> <li>6. Determine the partition coefficient of the drugs.</li> </ol>
38.	18BP407P	Physical Pharmaceutics – II Practical	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Understand the Preformulation parameters to be carried out in a new drug.</li> <li>2. Discover different reaction rates.</li> <li>3. Interpret the values from accelerated stability studies.</li> <li>4. Build practical skills for new drug development process.</li> <li>5. Demonstrate the sedimentation rate of various drug products.</li> <li>6. Express the evaluation methods used in rheology.</li> </ol>
39.	18BP408P	Pharmacology – I Practical	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Understand the instruments used in experimental pharmacology.</li> <li>2. Maintain the laboratory animals as per CPCSEA guidelines.</li> <li>3. Demonstrate the Blood withdrawal, serum and plasma separation, anesthetics.</li> <li>4. Administer the drugs in different routes.</li> <li>5. Explain the euthanasia used for animal studies.</li> <li>6. Screen the drugs with the use of various pharmacological instruments.</li> </ol>
40.	18BP409P	Pharmacognosy and Phytochemistry – I Practical	On successful completion of the course the student will <ol style="list-style-type: none"> <li>1. Analyze the crude drugs by chemical tests.</li> <li>2. Determine the stomatal number and index and vein islet number, vein islet termination and palisade ratio.</li> <li>3. Determine the starch grains, calcium oxalate crystals by eye piece micrometer.</li> <li>4. Perform the Fiber length and width starch grains by Lycopodium spore method.</li> <li>5. Analyze the purity of crude drugs by ash value and extractive value.</li> <li>6. Determine the moisture content, swelling index and foaming index.</li> </ol>

41.	17BP501T	Medicinal Chemistry – II Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Illustrate the classification of drugs.</li> <li>2. Explain the mechanism of action of drugs.</li> <li>3. Understand the chemistry of drugs with respect to their pharmacological activity.</li> <li>4. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.</li> <li>5. Know the Structural Activity Relationship of different class of drugs.</li> <li>6. Study the chemical synthesis of selected drugs.</li> </ol>
42.	17BP502T	Industrial Pharmacy – I Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Acquire knowledge about the various pharmaceutical dosage forms and their manufacturing techniques.</li> <li>2. Discover various formulation considerations in development of pharmaceutical dosage forms like tablets, capsules, etc.</li> <li>3. Understand the quality control tests for the dosage forms.</li> <li>4. Detail on parenterals, stringent procedures in the preparation and its evaluation.</li> <li>5. Understand clearly about packaging and cosmetic preparations.</li> <li>6. Interpret the various pharmaceutical additives to be included in all dosage forms.</li> </ol>
43.	17BP503T	Pharmacology – II Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Demonstrate the Pharmacology of drugs acting on various cardio vascular disease.</li> <li>2. Explain the drug used in the therapy of shock, Pharmacology of coagulants, anticoagulants, Fibrinolytics, anti-platelet drugs, Diuretics and Anti-diuretics.</li> <li>3. Illustrate the Pharmacology of Autocoids, Non-steroidal anti-inflammatory agents, Anti-gout drugs and Antirheumatic drugs.</li> <li>4. Outline the Pharmacology of drugs acting on endocrine system.</li> <li>5. Describe the Principles, applications of bioassay and bioassay of various drugs.</li> <li>6. Summarize the drugs acting on the uterus and oral contraceptives.</li> </ol>
44.	17BP504T	Pharmacognosy and Phytochemistry –II Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the Composition, chemistry &amp; chemical classes, biosources, therapeutic uses and commercial applications.</li> <li>2. Metabolic pathways in higher plants and their determination.</li> <li>3. Explain the modern extraction techniques, characterization and identification of the herbal drugs and Phytoconstituents.</li> <li>4. Understand the preparation and development of herbal formulation.</li> <li>5. Understand the herbal drug interactions.</li> <li>6. Isolate and identify the Phytoconstituents.</li> </ol>

45.	17BP505T	Pharmaceutical Jurisprudence Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Exploit the Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.</li> <li>2. Demonstrate various Indian pharmaceutical Acts and Laws.</li> <li>3. Understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.</li> <li>4. Elicit the code of ethics during the pharmaceutical practice.</li> <li>5. Acquire clear idea on drug price control order and its implication in India.</li> <li>6. Acquire information regarding the licenses to be achieved for a new drug discovery process.</li> </ol>
46.	17BP506P	Industrial Pharmacy – I Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Manufacture tablets.</li> <li>2. Understand the strict formulation considerations in parenteral and ophthalmic manufacturing.</li> <li>3. Demonstrate the evaluations of different packaging materials in pharmaceutical industry.</li> <li>4. Achieve skills in making a pharmaceutical product.</li> <li>5. Demonstrate the manufacturing of capsules.</li> <li>6. Exploit the formulation of various cosmetics.</li> </ol>
47.	17BP507P	Pharmacology – II Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the in-vitro pharmacology, PA2 and PD2 values.</li> <li>2. Record the Effect of drugs on frog, dog heart and blood pressure.</li> <li>3. Record the DRC of acetylcholine, estimate the Bioassay of histamine, oxytocin, serotonin by interpolation bioassay method.</li> <li>4. Estimate the Bioassay of histamine, oxytocin, serotonin by matching bioassay.</li> <li>5. Demonstrate the Anti-inflammatory activity and Analgesic activity in animal models.</li> <li>6. Explain the three point and four-point bioassay.</li> </ol>
48.	17BP508P	Pharmacognosy and Phytochemistry – II Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Perform the histology and powder characteristics &amp; extraction &amp; detection of Phytoconstituents.</li> <li>2. Isolate and detect the active principles.</li> <li>3. Separate the sugars by Paper chromatography.</li> <li>4. Perform TLC of herbal extract.</li> <li>5. Distillate the volatile oils and detects the Phytoconstituents by TLC.</li> <li>6. Analysis of crude drugs by chemical tests.</li> </ol>
49.	17BP601T	Medicinal Chemistry – III Theory	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Illustrate the classification of drugs.</li> <li>2. Explain the mechanism of action of drugs.</li> <li>3. Understand the chemistry of drugs with respect to their biological activity.</li> <li>4. Know the metabolism, adverse effects and therapeutic value of drugs.</li> <li>5. Discuss the importance of SAR of drugs.</li> </ol>

			6. Understand the importance of drug design and different techniques of drug design.
50.	17BP602T	Pharmacology – III Theory	On successful completion of the course the student will 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.

			6. Acquire scientific application in the field of genetic engineering, medicine and fermentation technology.
54.	17BP606T	Pharmaceutical Quality Assurance Theory	On successful completion of the course the student will 1. Understanding 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. 3. Perform assay of drug substances. 4. Draw structures of chemicals using softwares. 5. Determine physicochemical properties for drugs using software. 6. Screen drug likeliness.
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

			drug delivery systems, their formulation and evaluation. 6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.
59.	16PYU702	Advanced Pharmacognosy – I	On successful completion of the course the student will 1. Explain the basic principles of extraction and various modern extraction techniques. 2. Understand the biogenesis of secondary metabolites. 3. Elaborate the plant-based industries and institutions involved in work on medicinal and aromatic plants in India. 4. Demonstrate the Industrial production and estimation of Phytoconstituents. 5. Perform the Herbal formulation and standardization. 6. Explain the Nutraceuticals.
60.	16PYU703	Medicinal Chemistry – III	On successful completion of the course the student will 1. Describe the isolation of the Phytoconstituents. 2. Prepare the hair care preparation. 3. Prepare the skin care the preparation. 4. Demonstrate the Amino acid by ascending chromatography. 5. Perform the Thin layer chromatography of Curcumin. 6. Understand the isolation and formulation procedure.
61.	16PYU704	Pharmacology – III	On successful completion of the course the student will 1. Describe the Pharmacology of various endocrine Hormones. 2. Explain the Insulin, Oral Hypoglycemic agents, Sex hormones, and oral contraceptives. 3. Enlight the Pharmacology of Drugs acting on the Gastrointestinal Tract. 4. Brief the principles, methods of Bioassay and the bioassay of insulin, oxytocin, vasopressin, ACTH, histamine and 5-HT. 5. Explain the Immunopharmacology, Immunostimulants and Immunosuppressants. 6. Define the drugs acting on the uterus.
62.	16PYU705	Modern Methods of Pharmaceutical Analysis – I	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 drug analysis. 5. Understand the principles of volumetric and electro chemical analysis. 6. Carry out various volumetric and electro chemical titrations.
63.	16PYU711	Formulative Pharmacy &	On successful completion of the course the student will

		Biopharmaceutics Laboratory – I	<ol style="list-style-type: none"> <li>1. The various pharmaceutical dosage forms and their manufacturing techniques.</li> <li>2. Know various considerations in development of pharmaceutical dosage forms.</li> <li>3. Formulate solid and novel drug delivery system.</li> <li>4. Know evaluation of pharmaceutical dosage forms.</li> <li>5. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.</li> <li>6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.</li> </ol>
64.	16PYU712	Advanced Pharmacognosy Laboratory – I	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Describe the isolation of the Phytoconstituents.</li> <li>2. Prepare the hair care preparation.</li> <li>3. Prepare the skin care the preparation.</li> <li>4. Demonstrate the Amino acid by ascending chromatography.</li> <li>5. Perform the Thin layer chromatography of Curcumin.</li> <li>6. Understand the isolation and formulation procedure.</li> </ol>
65.	16PYU713	Medicinal Chemistry Laboratory – III	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the chemistry of drugs with respect to their pharmacological activity.</li> <li>2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.</li> <li>3. Know the structural activity relationship of different class of drugs.</li> <li>4. Write the chemical synthesis of some drug.</li> <li>5. Know the Structural Activity Relationship (SAR) of different class of drugs.</li> <li>6. Emphasizes on chemical synthesis of important drugs under each class.</li> </ol>
66.	16PYU714	Pharmacology Laboratory – III	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain about in-vitro pharmacology and prepare the Physiological salt solutions.</li> <li>2. Estimate the bioavailability parameters viz AUC, <math>T_{max}</math>, <math>K_{el}</math> from blood sample.</li> <li>3. Demonstrate the CRC of acetylcholine by using suitable muscle preparations.</li> <li>4. Estimate the bioavailability parameters viz AUC, <math>T_{max}</math>, <math>K_{el}</math> from urine sample.</li> <li>5. Record the CRC of Nor-adrenaline on rat anococcygeus muscle.</li> <li>6. Record the CRC of 5HT on rat fundus preparation.</li> </ol>
67.	16PYU715	Modern Methods of Pharmaceutical Analysis Laboratory – I	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know the principle and applications of instrumentation</li> <li>2. Understand the components and working of various analytical instruments.</li> <li>3. Understand the different modern techniques of drug analysis.</li> <li>4. Appreciate the advantages of instrumental methods drug analysis.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Understand the principles of volumetric and electro chemical analysis.</li> <li>6. Carry out various volumetric and electro chemical titrations.</li> </ol>
68.	16PYU7E01	Pharmaceutical Marketing	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. The course aim is to provide an understanding of marketing concepts and techniques and the application of the same in the pharmaceutical industry.</li> <li>2. Know the product decision and product management in pharmaceutical industry.</li> <li>3. Know the Pharmaceutical marketing channels and Designing channel.</li> <li>4. The course touches various aspects of the Pharmaceutical industry like analysis, research, sales, consultation, administration and distribution. It incorporates various managerial and research skills and business strategies.</li> <li>5. The areas of study within the course include research, communication, management, accounting, finance, pharmaceutical science, and several other aspects of the Pharmaceutical business.</li> <li>6. The course deals with the theoretical as well as with the practical aspect of the subject. Apart from the theory papers, it is also supported by various assignments, presentations, quizzes and internships.</li> </ol>
69.	16PYU7E02	Pharmaceutical Regulatory Science	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know about the process of drug discovery and development.</li> <li>2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.</li> <li>3. Know the regulatory approval process and their registration in Indian and international markets. Explain basic understanding of developing clinical trial protocols.</li> <li>4. Understand the concept of pharmacovigilance and its significance.</li> <li>5. Learn the basic understanding the importance of Orange book, Federal Register, Code of Federal Regulatory, and Purple book</li> <li>6. Explain the Registration of Indian drug product in overseas market.</li> </ol>
70.	16PYU7E03	Pharmacovigilance	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the history and development of pharmacovigilance, National and international scenario of pharmacovigilance.</li> <li>2. Understand the Dictionaries, coding and terminologies used in pharmacovigilance.</li> <li>3. Explain the detection of new adverse drug reactions and their assessment</li> <li>4. Discuss the drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation.</li> </ol>

			<ol style="list-style-type: none"> <li>5. Explain ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning.</li> <li>6. Describe the CIOMS requirements for ADR reporting, Writing case narratives of adverse events and their quality.</li> </ol>
71.	16PYU7E04	Quality Control and Standardizations of Herbals	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know the Quality assurance in herbal drug industry of GMP.</li> <li>2. Know the evaluation techniques for the herbal drugs.</li> <li>3. Know the Stability testing of herbal medicines</li> <li>4. Explain basic tests for drugs to obtain dosage form for pharmaceutical substances and medicinal plants.</li> <li>5. Explain methods for evaluation of pharmaceutical substances, medicinal plants and commercial crude drugs along with WHO guidelines for quality control for herbal drugs.</li> <li>6. Describe guidelines for cGMP, GAP, GMP and GLP for quality assurance of herbal drugs in industry.</li> </ol>
72.	16PYU7E05	Cell and Molecular Biology	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the importance, evolution and diversity of cells.</li> <li>2. Learns to visualize the cells by employing different types of microscopes.</li> <li>3. Able to describe the organization, structure and functions of cell organelles.</li> <li>4. Understand the biochemical pathways associated with the cellular organelles.</li> <li>5. Rationalize different transport mechanisms occurring in the cell.</li> <li>6. Understand the cell signalling mechanisms.</li> </ol>
73.	16PYU801	Formulative Pharmacy & Biopharmaceutics – II	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know the various pharmaceutical dosage forms and their manufacturing techniques.</li> <li>2. Know various considerations in development of pharmaceutical dosage forms.</li> <li>3. Formulate solid and novel drug delivery system.</li> <li>4. Know evaluation of pharmaceutical dosage forms.</li> <li>5. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.</li> <li>6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.</li> </ol>
74.	16PYU802	Advanced Pharmacognosy – II	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the basic principles of extraction and various modern extraction techniques.</li> <li>2. Understand the biogenesis of secondary metabolites.</li> <li>3. Elaborate the plant based industries and institutions involved in work on medicinal and aromatic plants in India.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Demonstrate the Industrial production and estimation of Phytoconstituents.</li> <li>5. Perform the Herbal formulation and standardization.</li> <li>6. Explain the Nutraceuticals.</li> </ol>
75.	16PYU803	Medicinal Chemistry – IV	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the chemistry of drugs with respect to their pharmacological activity.</li> <li>2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.</li> <li>3. Know the structural activity relationship of different class of drugs.</li> <li>4. Write the chemical synthesis of some drug.</li> <li>5. Understand the importance of drug design and understand the different modern techniques of drug design.</li> <li>6. Know the metabolism- adverse effect and therapeutic value of drugs.</li> </ol>
76.	16PYU804	Pharmacology – IV	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the mechanism of drug action and its relevance in the treatment of different diseases.</li> <li>2. Comprehend the principles of toxicology and treatment of various poisonings.</li> <li>3. Locate and isolate different organs/tissues from the laboratory animals used in pharmacological experiments.</li> <li>4. Demonstrate the various receptor actions using isolated tissue preparation.</li> <li>5. Appreciate correlation of pharmacology with related medical sciences.</li> <li>6. Enlight the Pharmacology of Drugs acting on the Gastrointestinal Tract.</li> </ol>
77.	16PYU805	Modern Methods of Pharmaceutical Analysis – II	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know the principle and applications of instrumentation.</li> <li>2. Understand the components and working of various analytical instruments.</li> <li>3. Understand the different modern techniques of drug analysis.</li> <li>4. Appreciate the advantages of instrumental methods drug analysis.</li> <li>5. Understand the principles of volumetric and electro chemical analysis.</li> <li>6. Carry out various volumetric and electro chemical titrations.</li> </ol>
78.	16PYU811	Formulative Pharmacy & Biopharmaceutics Laboratory – II	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain the various pharmaceutical dosage forms, their manufacturing techniques and evaluation of pharmaceutical dosage forms.</li> <li>2. Know various considerations in development of pharmaceutical dosage forms.</li> <li>3. Formulate solid and novel drug delivery system.</li> <li>4. To understand the criteria for selection of drugs and polymers for the development of</li> </ol>

			<ol style="list-style-type: none"> <li>5. Novel drug delivery systems, their formulation and evaluation</li> <li>6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.</li> </ol>
79.	16PYU812	Advanced Pharmacognosy Laboratory – II	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Prepare and standardize the Herbal medicine.</li> <li>2. Prepare and standardize the Herbal cosmetics.</li> <li>3. Perform the Ayurvedic formulation leghya.</li> <li>4. Demonstrate the plant tissue culture.</li> <li>5. Extract the volatile oils from natural sources.</li> <li>6. Isolate the plant enzymes.</li> </ol>
80.	16PYU813	Medicinal Chemistry Laboratory – IV	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the chemistry of drugs with respect to their pharmacological activity.</li> <li>2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.</li> <li>3. Know the structural activity relationship of different class of drugs.</li> <li>4. Write the chemical synthesis of some drug.</li> <li>5. Know the Structural Activity Relationship (SAR) of different class of drugs.</li> <li>6. Perform assay of medicinal compounds.</li> </ol>
81.	16PYU814	Pharmacology Laboratory – IV	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Explain about in-vitro pharmacology and prepare the Physiological salt solutions.</li> <li>2. Estimate the bioavailability parameters viz AUC, <math>T_{max}</math>, <math>K_{el}</math> from blood sample.</li> <li>3. Demonstrate the CRC of acetylcholine by using suitable muscle preparations.</li> <li>4. Estimate the bioavailability parameters viz AUC, <math>T_{max}</math>, <math>K_{el}</math> from urine sample.</li> <li>5. Record the CRC of Nor adrenaline on rat anococcygeus muscle.</li> <li>6. Record the CRC of 5HT on rat fundus preparation.</li> </ol>
82.	16PYU815	Modern Methods of Pharmaceutical Analysis Laboratory – II	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Know the principle and applications of instrumentation</li> <li>2. Understand the components and working of various analytical instruments.</li> <li>3. Understand the different modern techniques of drug analysis.</li> <li>4. Appreciate the advantages of instrumental methods drug analysis.</li> <li>5. Understand the principles of volumetric and electro chemical analysis.</li> <li>6. Carry out various volumetric and electro chemical titrations.</li> </ol>
83.	16PYU891	Project Work & Viva Voce	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Work in team and undertake a project in the area of Pharmacy.</li> <li>2. Apply concepts of pharmaceutical sciences for executing the project.</li> <li>3. Apply appropriate research methodology while formulating a project.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Define specifications, synthesize, analyse, develop and evaluate a project.</li> <li>5. Present, exhibit and document the project work .</li> <li>6. Develop a project report.</li> </ol>
84.	16PYU8OE01	Molecular Modelling	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Learn various force fields, simulation methods in molecular modelling.</li> <li>2. Have better understanding on molecular docking and ligand based drug design methods.</li> <li>3. Recognize the benefits of simulation model studies.</li> <li>4. Have knowledge of quantum mechanics and molecular mechanics &amp; dynamics.</li> <li>5. Understand the docking and ligand based drug design methods.</li> <li>6. Understand and be conversant with the basic principles of molecular modelling.</li> </ol>
85.	16PYU8OE02	Molecular Biology	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Have strong understanding of classical genetics,</li> <li>2. Understand the structure of nucleic acids, transcription, translation and gene regulation.</li> <li>3. Understand the types of RNA, gene coding, mutation and repair of DNA.</li> <li>4. Understand the structure of DNA and differentiate the process of replication in prokaryotes and eukaryotes.</li> <li>5. Understand the structure of nucleic acids and DNA replication.</li> <li>6. Understand about transcription in prokaryotes and eukaryotes.</li> </ol>
86.	16PYU8OE03	Bioinformatics	<p>On successful completion of the course the student will.</p> <ol style="list-style-type: none"> <li>1. Introduction to the basics of sequence alignment and analysis.</li> <li>2. Overview about biological macromolecular structures and structure prediction methods.</li> <li>3. To get exposure with the use of database tools.</li> <li>4. To understand in depth about protein structure prediction.</li> <li>5. To understand the alignment types like local alignment global alignment.</li> <li>6. Explain about different types of protein and other organism specific databases.</li> </ol>
87.	16PYU8OE04	Bioprocess Engineering	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Help the students to familiarize with various reactors used in bioprocess engineering</li> <li>2. Learn analysis of STR and other configurations.</li> <li>3. Understand WHO Guidelines on good manufacturing Practices.</li> <li>4. Learn about the scale up of bioreactors.</li> <li>5. Get clear understanding of the fermentation processes.</li> <li>6. Get exposure for the commercial production of bioproducts.</li> </ol>
88.	16PYU8OE05	Computer Aided Design	<p>On successful completion of the course the student will</p>

			<ol style="list-style-type: none"><li>1. Able to organize, summarize, and display quantitative data.</li><li>2. Comfortable with statistical methods for calculating summary estimates, measures of variability, and confidence intervals.</li><li>3. Know about parametric design and object representation and geometric modelling.</li><li>4. Apply the strategies of drug design to develop new molecules with therapeutic activity</li><li>5. Design new drugs using informatics and databases</li><li>6. Understand significance and concept of advanced instrumentation</li></ol>
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Name of the Department: **Faculty of Pharmacy**

**Course:** Pharm.D.

Sl. No.	Course Code	Name of the Course	Course Outcomes
1.	19PD101T	Human Anatomy and Physiology	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Describe the structure (gross and histology) and functions of various organs of the human body.</li><li>2. Describe the various homeostatic mechanisms and their imbalances of various systems.</li><li>3. Identify the various tissues and organs of the different systems of the human body.</li><li>4. Perform the haematological tests and also record blood pressure, heart rate, pulse and respiratory volumes.</li><li>5. Appreciate coordinated working pattern of different organs of each system.</li><li>6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.</li></ol>
2.	19PD102T	Pharmaceutics	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Understand the history of profession of pharmacy.</li><li>2. Understand the basics of different dosage forms.</li><li>3. Understand the professional way of handling the prescription</li><li>4. Prepare various conventional dosage forms.</li><li>5. Develop a clear idea about Pharmaceutical incompatibility and different pharmaceutical calculations in pharmacy.</li><li>6. Predict the instability problems in semi sold dosage forms.</li></ol>
3.	19PD103T	Medicinal Biochemistry	On successful completion of the course the student will <ol style="list-style-type: none"><li>1. Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.</li><li>2. Know the metabolic process of biomolecules in health and illness (metabolic disorders).</li><li>3. Understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism.</li><li>4. Know the biochemical principles of organ function tests of kidney, liver and endocrine gland.</li><li>5. Do the qualitative analysis and determination of biomolecules in the body fluids.</li><li>6. To know energy rich compounds; ATP, Cyclic AMP and their biological significance.</li></ol>
4.	19PD104T	Pharmaceutical Organic Chemistry	On successful completion of the course the student will

			<ol style="list-style-type: none"> <li>1. Understand the classification and nomenclature of organic compounds, and the concepts of isomerism.</li> <li>2. Write the structure, name and the type of isomerism of the organic compound.</li> <li>3. Schematize the reaction/reaction mechanism and name the reaction</li> <li>4. Explain the orientation of reactions.</li> <li>5. Account for reactivity/stability of compounds.</li> <li>6. Identify/confirm the organic compounds.</li> </ol>
5.	19PD105T	Pharmaceutical Inorganic Chemistry	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;</li> <li>2. Know the analysis of the inorganic pharmaceuticals their applications;</li> <li>3. Appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.</li> <li>4. Identify the errors in analysis.</li> <li>5. Understand the principles of volumetric analysis and electrochemical analysis</li> <li>6. Applications of volumetric analysis.</li> </ol>
6.	19PD106RMT	Remedial Mathematics	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the partial fraction, logarithms, function and limits.</li> <li>2. Perform calculations using matrices and determinants.</li> <li>3. Solve problems using differential and integral calculus.</li> <li>4. Calculate the equation for straight line and coordinates.</li> <li>5. Apply differential equations and Laplace transformation for solving problems.</li> <li>6. Appreciate the important application of mathematics in Pharmacy.</li> </ol>
7.	19PD107P	Human Anatomy and Physiology Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Identify epithelial, connective tissue, muscular, nervous tissues microscopically and the axial, appendicular bones.</li> <li>2. Determine the bleeding time, clotting time.</li> <li>3. Record the heart rate, pulse rate, blood pressure.</li> <li>4. Demonstrate the WBC count and RBC count.</li> <li>5. Identify the axial, appendicular bones.</li> <li>6. Estimate the blood group and erythrocyte sedimentation rate.</li> </ol>
8.	19PD108P	Pharmaceutics Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Understand the professional way of preparing a prescription.</li> <li>2. Prepare various liquid dosage forms.</li> <li>3. Prepare various solid dosage forms.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Perform quality control tests for various dosage forms.</li> <li>5. Acquire the knowledge of using equipment's in pharmaceutical industry.</li> <li>6. Develop a clear idea about Pharmaceutical incompatibility and different pharmaceutical calculations in pharmacy.</li> </ol>
9.	19PD109P	Medicinal Biochemistry Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Qualitatively analyze the biomolecules.</li> <li>2. Quantitatively analyze biochemical parameters and their importance in diagnosis of disease.</li> <li>3. Systematically analyse the urine for abnormal constituents.</li> <li>4. Identify the biomolecules using chemical tests.</li> <li>5. Determine the enzymatic activity.</li> <li>6. Study the effect of physical parameters on the enzymatic activity.</li> </ol>
10.	19PD110P	Pharmaceutical Organic Chemistry Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Systematically perform qualitative analysis of unknown organic compounds.</li> <li>2. Detect special elements in an organic sample.</li> <li>3. Confirm unknown compounds by m.p./b.p.</li> <li>4. Prepare derivatives of organic compounds.</li> <li>5. Prepare the solid derivatives from organic compounds.</li> <li>6. Construct molecular models.</li> </ol>
11.	19PD111P	Pharmaceutical Inorganic Chemistry Practical	<p>On successful completion of the course the student will</p> <ol style="list-style-type: none"> <li>1. Analyze the limit test for samples.</li> <li>2. Prepare the solutions for volumetric and electro-analytical methods.</li> <li>3. Standardize the solutions by volumetric and electro-analytical methods.</li> <li>4. Perform the assay for chemical substances.</li> <li>5. Standardize the titrant used for the assay.</li> <li>6. Determine the strength of the solutions by electro-analytical methods.</li> </ol>