

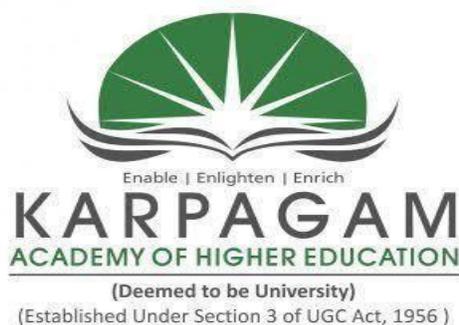
# **B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS**

**SYLLABI 2025-2026**

**(CHOICE BASED CREDIT SYSTEM)**

**Department of Computer Science and Business Systems**

**FACULTY OF ENGINEERING**



**KARPAGAM ACADEMY OF HIGHER EDUCATION**

**(Deemed to be University)**

**(Established Under Section 3 of UGC Act, 1956)**

**(Accredited with A+ Grade by NAAC in the Second Cycle)**

**Pollachi Main Road, Eachanari Post**

**Coimbatore-641 021**



**KARPAGAM ACADEMY OF HIGHER EDUCATION**  
(Deemed to be University Established under Section 3 of UGC Act 1956)

**Eachanari, Coimbatore-641 021. INDIA**

**FACULTY OF ENGINEERING**  
**DEGREE OF BACHELOR OF ENGINEERING / TECHNOLOGY**

**REGULAR PROGRAMME**  
**REGULATIONS 2025**  
**CHOICE BASED CREDIT SYSTEM**

**These regulations are effective from the academic year 2025 – 2026 and applicable to the candidates admitted to B. E. / B. Tech programmes. during 2025- 2026 and onwards.**

## **1. ADMISSION**

**1.1** Candidates seeking admission to the first semester of the eight semesters B. E./B.Tech Degree Programme:

Should have passed the Higher Secondary Examination (10+2) prescribed by the State Government

/ Central Government with Mathematics/ Physics/ Chemistry/ Computer Science/ Electronics/ Information Technology/ Biology/ Informatics Practices/ Biotechnology/ Technical Vocational subject/ Agriculture/ Engineering Graphics/ Business Studies/ Entrepreneurship. (Any of the above three subjects) or any similar Examination of any other institution/ University or authority accepted by the Karpagam Academy of Higher Education as equivalent thereto).

Should have obtained at least 45% marks (40% marks in case of candidates belonging to SC / ST reserved category) in the above subjects taken together.

### **1.2 Lateral Entry Admission**

Candidates who possess Diploma in Engineering / Technology (10+3 or 10+2+2) awarded by the Directorate of Technical Education with passed minimum THREE years / TWO years (Lateral Entry) Diploma examination with at least 45% marks (40% marks in case of candidates belonging to SC / ST reserved category) in ANY branch of Engineering and Technology are eligible to apply for admission to the third semester of B. E./B. Tech., subject to vacancies in the First Year, in case the vacancies at lateral entry are exhausted. (The University will offer suitable bridge courses such as Mathematics, Physics, Engineering drawing, etc., for the students coming from diverse backgrounds to achieve desired learning outcomes of the programme)

**(OR)**

B.Sc. Degree from a recognized University as defined by UGC, with at least 45% marks (40%

marks in case of candidates belonging to SC / ST reserved category) and passed 10+2 examination with Mathematics as a subject.

**(OR)**

Passed D.Voc. Stream in the same or allied sector.

(The University will offer suitable bridge courses such as Mathematics, Physics, Engineering drawing, etc., for the students coming from diverse backgrounds to achieve desired learning outcomes of the programme)

**Eligibility criteria for admission in the third semester is given in the table below.**

| S. No. | Programme   | Eligibility criteria  |
|--------|---|---|
| 1      | B.E Bio Medical Engineering                             | <p>Passed Minimum THREE years / TWO years (Lateral Entry) Diploma examination with at least 45% marks (40% marks in case of candidates belonging to reserved category) in ANY branch of Engineering and Technology.</p> <p style="text-align: center;"><b>OR</b></p> <p>Passed B.Sc. Degree from a recognized University as defined by UGC, with at least 45% marks (40% marks in case of candidates belonging to SC / ST reserved category) and passed 10+2 examination with Mathematics as a subject.</p> <p style="text-align: center;"><b>OR</b></p> <p>Passed D.Voc. Stream in the same or allied sector.</p> <p>(The Universities will offer suitable bridge courses such as Mathematics, Physics, Engineering drawing, etc., for the students coming from diverse backgrounds to achieve desired learning outcomes of the programme)</p> |
| 2      | B. E. Civil Engineering                                 |   |
| 3      | B. E. Computer Science and Engineering                  |   |
| 4      | B. E. Computer Science and Engineering (Cyber security) |   |
| 5      | B. E. Electrical and Electronics Engineering            |   |
| 6      | B. E. Electronics and Communications Engineering        |   |
| 7      | B. E. Mechanical Engineering                            |   |
| 8      | B. Tech. Artificial Intelligence and Data Science       |   |
| 9      | B. Tech. Computer Science and Business Systems          |   |
| 10     | B. Tech Bio – Technology                                |   |
| 11     | B. Tech Food Technology                                 |   |

### 1.3 Migration from other University

Candidates who are willing to migrate to Karpagam Academy of Higher Education for admission to their next semester of B. E./B. Tech programme may get admitted from 2<sup>nd</sup> semester onwards upto 5<sup>th</sup> semester. The student will be exempted from appearing for Examination of the equivalent courses passed in the earlier programme and will have to appear for courses which he/she has not done during the period of his/her earlier programme. Along with the request letter and mark sheets,

he/she has to submit a copy of syllabus of the programme duly attested by the Competent authority, he/she has undergone. Programme Equivalence Certificate shall be given by the respective Head of the Department of Karpagam Academy of Higher Education, after verifying the credentials.

## **2. PROGRAMMES OFFERED**

A candidate may undergo a programme in any one of the branches of study approved by the University as given below.

List of B. E. and B. Tech. Degree Programmes

1. B.E Bio Medical Engineering
2. B. E. Civil Engineering
3. B. E. Computer Science and Engineering
4. B. E. Computer Science and Engineering (Cyber Security)
5. B. E. Electrical and Electronics Engineering
6. B. E. Electronics and Communications Engineering
7. B. E. Mechanical Engineering
8. B.Tech. Artificial Intelligence and Data Science
9. B. Tech. Computer Science and Business Systems
10. B. Tech. Bio-Technology
11. B. Tech Food Technology

## **3. MODE OF STUDY**

### **3.1 Full-Time:**

In this mode of study, the candidates are required to attend classes regularly on the specified working days of the University.

**3.2** Change from one programme to another is not permitted.

## **4. STRUCTURE OF PROGRAMMES**

**4.1** Every programme will have a curriculum with syllabus consisting of theory and practical courses such as:

- (i) General core courses comprising Mathematics, Basic Sciences, Engineering Sciences and Humanities.
- (ii) Core courses of Engineering/Technology.
- (iii) Elective courses for specialization in related fields.
- (iv) Workshop practice, computer practice, engineering graphics, laboratory work, internship, seminar presentation, project work, industrial visits, camps, etc.

Every student is encouraged to participate in at least any one of the following programmes

- NSS / Sports/Physical exercise/NCC/YRC.
- Other Co-Curricular and Extra Curricular activities

#### (V) Choice Based Credit System

CBCS is introduced for students admitted in the academic year 2017-18 onwards. As per AICTE guidelines, CBCS is an approach in which students opt for courses of their choice. CBCS provides greater flexibility with multiple courses and enable students to undergo additional courses. CBCS is applicable to Full Time Undergraduate & Post Graduate Programmes of study. It provides a choice for students to select from the prescribed courses (Professional core, Professional Electives, Open Electives, Value added courses, Humanity Sciences, Basic sciences & Engineering sciences). A course designated as hard core for a particular programme of study must invariably be completed by the student to receive the degree in the programme. The Hardcore courses cannot be substituted by another courses. Students can exercise their choice among a set of soft core courses from the list of soft core courses specified for each Programme of study. **The student should meet the criteria for prerequisites to become eligible to register for that course. The student should request and register for the course for every semester within the first week of semester.** Maximum number of students to be registered in each course shall be decided by the HoD in consultation with the Dean. Registration of already requested courses by students in previous semester is not allowed.

**4.2** Each course is normally assigned certain number of credits.

|   |     |
|---|-----|
| No. of credits per lecture period per week  | : 1 |
| No. of credits per tutorial period per week   | : 1 |
| No. of credits for 3 periods of laboratory course per week                                | : 2 |
| No. of credits for 3 periods of project work per week                                     | : 2 |
| No. of credits for 2 weeks of field project/internship training during semester vacations | : 1 |

**4.3** In every semester, the curriculum shall normally have a blend of theory courses not exceeding 6 and practical courses not exceeding 4.

**4.4** The prescribed credits required for the award of the degree shall be within the limits specified below.

| PROGRAMME      | PRESCRIBED CREDIT RANGE |
|----------------|-------------------------|
| B. E./B. Tech. | 160– 165                |

**4.5** The medium of instruction for all Courses, Examinations, Seminar presentations and Project/ Thesis reports is English.

#### **4.6 Value Added Course (VAC / Skill Development Course (SDC))**

Besides core courses and elective courses, VAC / SDC are provided. The blend of different courses is so designed that the interested students would be trained for the holistic development to enhance employment opportunity. Upon completion of 30 Practical Hours / 15 Theory hours and evaluation, a student can claim for 1 additional credit.

**4.7** Evaluation of the courses comprises of two parts, one is the Continuous Internal Assessment (CIA) and the other one is the End Semester Examination (ESE). Evaluation of a mandatory course may be by Internal Assessment only.

### **5. DURATION OF THE PROGRAMME**

**5.1** The prescribed duration of the programme shall be

| <b>Programme</b>                          | <b>Min. No. of semesters</b> | <b>Max. No. of semesters</b> |
|---|------------------------------|------------------------------|
| B. E./B. Tech. (HSC Candidates)           | 8                            | 14                           |
| B. E./B. Tech. (Lateral Entry Candidates) | 6                            | 12                           |

**5.2** Each semester shall normally consists of 90 working days or 540 hours.

**5.3** Additional classes for improvement, conduct of model test, etc., over and above the specified periods shall be arranged, if required. But for the purpose of calculation of attendance requirement for eligibility to appear for the end semester Examinations (as per Clause 11) by the students, 540 hours conducted within the specified academic schedule alone shall be taken into account and the overall percentage of attendance shall be calculated accordingly.

### **6. REQUIREMENTS FOR COMPLETION OF THE SEMESTER**

**6.1** Ideally every student is expected to attend all classes and secure 100% attendance. However, in order to allow for certain unavoidable circumstances, the student is expected to attend at least 75% of the classes and the conduct of the candidate has been satisfactory during the course.

**6.2** A candidate who has secured attendance between 65% and 74.4% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness) shall produce medical certificate and fitness certificate by a Registered Medical Practitioner. The Head of the Department has to verify and certify the genuineness of the case before recommending to the Dean concerned. However, the candidate has to execute a one-time bond in Stamp paper duly signed by the parent and the student.

**6.3** Candidates who have not produced / submitted relevant documents for condonation will not

be permitted to proceed to the next semester and have to redo the course. However, they are permitted to write the arrear Examinations, if any.

## **7. Mentor**

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a Faculty of the Department who shall function as Mentor for those students throughout their period of study. Such Mentors shall advise the students and monitor the courses undergone by the students, check the attendance and progress of the students and counsel them periodically. If necessary, the Mentor may display the cumulative attendance particulars in the Department notice board and also discuss with or inform the Parents/Guardian about the progress of the students. Each student shall be provided with course plan for each course at the beginning of each semester.

## **8. CLASS COMMITTEE**

**8.1.** The class committee for a class under a particular branch is normally constituted by the Head of the Department. However, if the students of different branches are mixed in a class (like the first semester which is generally common to all branches), the class committee is to be constituted by the Dean.

**8.2.** Every class shall have a class committee consisting of teachers of the class concerned, Maximum of six student representatives [boys and girls] and the concerned Head of the Department. It is like the 'Quality Circle' with the overall goal of improving the teaching-learning process. The functions of the class committee include

- Clarifying the regulations of the degree programme and the details of rules therein particularly Clause 4 and 5 which should be displayed on Department Notice-Board.
- Informing all the students, the details of Regulations regarding weightage used for each assessment. In the case of practical courses (laboratory / drawing / project work / seminar, etc.) the breakup of marks for each experiment / exercise / module of work, should be clearly discussed in the class committee meeting and informed to the students.
- Solving problems experienced by students in the class room and in the laboratories.
- Informing the student representatives, the academic schedule, including the dates of assessments and the syllabus coverage for each assessment.
- Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.
- Identifying the weak students, if any and requesting the teachers concerned to provide some additional academic support.

**8.3** The class committee shall be constituted within the first week of each semester.

**8.4** The Chairperson of the Class Committee may convene the meeting of the class committee.

**8.5** The Dean may participate in any Class Committee of the Faculty.

**8.6** The Chairperson is required to prepare the minutes of every meeting, submit the same to Dean through the HOD within two days of the meeting and arrange to circulate it among the students and teachers concerned. If there are some points in the minutes requiring action by the Executive Council, the same shall be brought to the notice of the Registrar/VC by the HoD through Dean.

**8.7** The first meeting of the Class Committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments within the framework of the regulations. Two subsequent meetings may be held in a semester at suitable intervals. During these meetings the student members representing the entire class, shall meaningfully interact and express their opinions and suggestions of the other students of the class in order to improve the effectiveness of the teaching-learning process.

## **9. COURSE COMMITTEE FOR COMMON COURSES**

Each common theory course offered to more than one discipline or one batch of students shall have a “Course Committee” comprising of all the faculty teaching the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Head of the Department/Dean depending upon whether all the faculty teaching the common course belong to a single department or several departments. The “Course committee” shall meet at least three times and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the course committee may also prepare a common question paper for the assessment test(s). The letter “G” is to be mentioned in the course code for the common course.

## **10. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT**

**10.1** Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' (Log book) which consists of attendance marked in each theory or practical or project work class, the test marks and the record of class work (topic covered), separately for each course.

**10.2 Continuous Internal Assessment (CIA):** The performance of students in each course will be continuously assessed by the respective teachers as per the guidelines given below:

**a. THEORY COURSES**

| S. No.                                       | CATEGORY   | MAXIMUM MARKS |
|--|------------|---------------|
| 1.   | Assignment | 5             |
| 2.   | Seminar *  | 5             |
| 3.   | Attendance | 5             |
| 4.   | Test – I   | 12.5          |
| 5.   | Test – II  | 12.5          |
| <b>Continuous Internal Assessment: TOTAL</b> |            | 40            |

\*Evaluation shall be made by a seminar committee.

**PATTERN OF TEST QUESTION PAPER (Test I & II)**

| INSTRUCTION          | REMARKS  |
|----------------------|--|
| <b>Maximum Marks</b> | 100  |
| <b>Duration</b>      | 3 Hours  |
| <b>Part – A</b>      | Question no. 1 to 10 Two Mark Questions, covering 2.5 units of the syllabus.<br><b>(10 x 2= 20 Marks)</b>  |
| <b>Part- B</b>       | Question 11 to 15 will be of either-or type, covering 2.5 units of the syllabus. Each Question may have subdivision.<br><b>(5 x 16=80 Marks)</b> |

**b. PRACTICAL COURSES**

| S. No  | CATEGORY                      | MAXIMUM MARKS |
|--|-------------------------------|---------------|
| 1.   | Attendance                    | 5             |
| 2.   | Observation work              | 5             |
| 3.   | Record work                   | 5             |
| 4.   | Internal Practical Assessment | 15            |
| 5.   | Viva – Voce [Comprehensive]   | 10            |
| <b>Continuous Internal Assessment: TOTAL</b> |                               | 40            |

Every practical exercise / experiment shall be evaluated based on the conduct of exercise/ experiment and records maintained.

### c. INTEGRATED THEORY AND PRACTICAL COURSES

The Continuous Internal Assessment for Integrated Theory and Practical Course is awarded for 40 Marks with mark split up similar to regular theory course. But Assignment and Seminar components are replaced by Observation and Record marks.

| S.No.  | CATEGORY    | MAXIMUM MARKS |
|--|-------------|---------------|
| 1.   | Observation | 5             |
| 2.   | Record      | 5             |
| 3.   | Attendance  | 5             |
| 4.   | Test –I     | 12.5          |
| 5.   | Test –II    | 12.5          |
| <b>Continuous Internal Assessment: TOTAL</b> |             | 40            |

The end semester evaluation of integrated practical component is for 50 Marks and it is scaled down to 15 Marks. Similarly, the end semester evaluation for integrated theory is 100 Marks and it is scaled down to 45 Marks. Hence, the external evaluation of integrated theory and practical elements accounts for 60 marks.

For the integrated course, the ESE mark distribution is as follows:

| Theory   | Practical | Total    |
|----------|-----------|----------|
| 45 marks | 15 Marks  | 60 Marks |

#### 10.3 ATTENDANCE

Attendance carries a maximum of 5 marks and the distribution is as under:

| S. No. | Attendance % | Marks |
|--------|--------------|-------|
| 1      | 91 and above | 5.0   |
| 2      | 81-90        | 4.0   |
| 3      | 76-80        | 3.0   |

#### 10.4 PROJECT WORK/ INTERNSHIPS

##### 10.4.1 Project Work

Final year project work will be normally in-house. However, as a special case, if a student is able to get a project from a government organization or private or public sector company, the student may be permitted to do his/her project work in that institution/research organization/industry.

The evaluation of Project phase I shall be through Continuous Internal assessment mode and Project phase II evaluation shall be through continuous assessments (Three reviews), evaluation of

project thesis report and viva-voce examination. Continuous assessment shall have the weightage of 40%. Evaluation of Project thesis report and viva-voce examination shall have the weightage of 60% each. Break-up of marks is as shown below:

**Project Phase I Evaluation:**

| <b>Continuous Internal Assessment<br/>(100 marks)</b> |                  |                   |
|---|------------------|-------------------|
| <b>Review I</b>                                       | <b>Review II</b> | <b>Review III</b> |
| 30 marks  | 30 marks         | 40 marks          |

**Project Phase II Evaluation:**

| <b>Continuous Internal Assessment<br/>(40 marks)</b> |                  |                   | <b>ESE (60 marks)</b>            |                 |                             |                 |
|--|------------------|-------------------|----------------------------------|-----------------|-----------------------------|-----------------|
| <b>Review I</b>                                      | <b>Review II</b> | <b>Review III</b> | <b>Project Report (30 marks)</b> |                 | <b>VIVA VOCE (30 marks)</b> |                 |
|  |                  |                   | <b>Supervisors</b>               | <b>External</b> | <b>Internal</b>             | <b>External</b> |
| 5 marks  | 15 marks         | 20 marks          | 15 marks                         | 15 marks        | 15 marks                    | 15 marks        |

**10.4.2 Internships**

Students must complete Internship for the duration specified in the program's corresponding curriculum. The industry in which the student intends to undergo internship should be aligned in line with the programme of study. The student must submit a report detailing observations, skills learned, usefulness, etc., together with the attendance certificate granted by the relevant industry after completing the internship or industrial training. A committee made up of three faculty members, appointed by the department head, will review this report. One faculty member will be designated as the coordinator. A student can claim one credit if he/she completes one week of training as per curriculum

**Weightage for Assessment for Internship**

| <b>Report</b> | <b>Presentation</b> | <b>Viva-Voce</b> |
|---------------|---------------------|------------------|
| 30 Marks      | 40 Marks            | 30 Marks         |

**11. REQUIREMENTS FOR APPEARING FOR END SEMESTER EXAMINATION(ESE)**

A candidate shall normally be permitted to appear for the ESE of any semester commencing from I semester if he/she has satisfied the semester completion requirements (Subject to Clause 5.2) and has registered for Examination in all courses of the semester. Registration is mandatory for

Semester Examinations as well as arrear Examinations failing which the candidate will not be permitted to attend the next semester. A candidate already appeared for a course in a semester and passed the Examination is not entitled to reappear in the same course of the semester for improvement of grade.

## 12. END SEMESTER EXAMINATION

ESE will be held at the end of each semester for each course, for 100 marks, it is scaled down to 60 marks.

### 12.1 ONLINE EXAMINATIONS

The students who are going for Project / Internship / Coursework at National level are permitted to write their CIA test through Online Mode and ESE in Offline/Online mode. When they go for an International Project / Internship / Coursework, both the CIA and ESE shall be conducted through online mode.

#### PATTERN OF ESE QUESTION PAPER:

| INSTRUCTION          | REMARKS   |
|----------------------|---|
| <b>Maximum Marks</b> | 100   |
| <b>Duration</b>      | 3 Hours   |
| <b>Part – A</b>      | Question no. 1 to 10 Two Mark Questions, covering all the 5 units.<br><b>(10 x 2= 20 Marks)</b>   |
| <b>Part- B</b>       | Question 11 to 15 will be of either or type, covering Fiveunits of the syllabus. Each Question may have subdivision.<br><b>(5 x 16=80 Marks).</b> |

## 13. PASSING REQUIREMENTS

**13.1** Minimum marks to pass: The minimum marks to pass for CIA is 20 (i.e. out of 40 marks). The minimum marks to pass for ESE is 30 (i.e. out of 60 marks). The overall minimum marks to pass for theory/laboratory course is 50 (Sum of his/her score in CIA and ESE) out of 100 marks.

**13.1.1** The minimum marks to pass for the Value Added Course /Skill Development is 50 marks out of 100marks. There will be two tests, the first covering 50% of syllabus for 50 marks and the other for 50 marks.

**13.2** If the candidate fails to secure a pass in ESE of a particular course, it is mandatory that candidate shall register and reappear for the Examination in that course during the subsequent

semester when Examination is conducted in that course. Further the candidate should continue to register and reappear for the Examination till a pass is secured in such supplementary Examination within the stipulated maximum duration of the programme (Clause 5.1).

The CIA marks obtained by the candidate in his/her first or subsequent appearance where he/she secures a pass shall be retained by the office of the Controller of Examinations and considered valid for all remaining attempts till the candidate secures a pass in his/her ESE.

**13.3** If the candidate fails to secure a pass in CIA of a particular course, it is mandatory that candidate shall register and reappear for the CIA in that course during the subsequent semester when CIA is conducted in that course by the faculty member assigned for that particular course during that semester by the concerned HOD. Further, the candidate should continue to register and reappear for the CIA till a pass is secured in such subsequent Examination within the stipulated maximum duration of the programme (Clause 5.1). The Evaluation for the CIA reappearance is as follows:

| <b>Test 1</b> | <b>Test 2</b> | <b>Assignment</b> | <b>Total</b> |
|---------------|---------------|-------------------|--------------|
| 15 marks      | 15 marks      | 10 marks          | 40 marks     |

#### **13.4 CREDIT TRANSFER THROUGH ONLINE PLATFORM / INTERNATIONAL STUDIES**

The MOOC coordinator shall assist the students for the online courses offered by the NPTEL/SWAYAM/Other online platforms periodically and also monitor their course.

Students are encouraged to enroll in courses offered by NPTEL/Swayam/ Swayam Plus platforms and international institutions of higher learning, either virtually or in person. The equivalent credits for these courses will be determined by a committee named Subject & Grade Equivalence Committee comprising the Dean of the Faculty as Chairman, Dean (R&D, Industrial Relations), Head of the Department (HoD) and one faculty member nominated by the Vice Chancellor as members. The committee's decision will be submitted for ratification/approval by the Board of Studies (BoS) and the Academic Council.

##### **13.4.1 Online Courses / Self Study Courses**

Students may be permitted to earn credit through online courses (which are provided with certificate) with the approval of Head of the Department and Dean. The credit may be transferred with the due approval for either programme core, elective or open elective course and complete at any time within the duration of the programme before the last semester.

### 13.4.2 One credit course

One credit elective course shall be offered by the department in collaboration with the industry/research organizations / higher learning institutions. A student shall be permitted to register for the one-credit courses offered by other departments with approval of both the Heads of the departments. A student shall replace a three credit programme elective / open elective course if he / she registered for three one credit courses and appear for the examination of the courses and get qualified in the examination. Three elective courses of 1 credit shall replace a 3-credit elective course as given in Table.

#### REPLACEMENTS OF ONE CREDIT COURSES

| Number of credits earned |                             | Eligible to replace |     |
|--------------------------|-----------------------------|---------------------|-----|
| Core electives           | Interdisciplinary electives | PEC                 | OEC |
| 3                        | 0                           | 1                   | -   |
| 2                        | 1                           | 1                   | -   |
| 1                        | 2                           | -                   | 1   |
| 0                        | 3                           | -                   | 1   |

Refer the Annexure I for NPTEL Course Durations and credit Equivalence. The Registration / Application form for Credit Transfer of SWAYAM-NPTEL / MOOC Courses shall be submitted as shown in Annexure I.

## 14. AWARD OF LETTER GRADES

**14.1** All assessments of a course will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate letter grades, each carrying certain number of points will be awarded as per the range of total marks (out of 100) obtained by the candidate in each subject as detailed below:

| Letter grade | Marks Range | Grade Point | Description  |
|--------------|-------------|-------------|--------------|
| O            | 91 – 100    | 10          | OUTSTANDING  |
| A+           | 81- 90      | 9           | EXCELLENT    |
| A            | 71-80       | 8           | VERY GOOD    |
| B+           | 61- 70      | 7           | GOOD         |
| B            | 56-60       | 6           | AVERAGE      |
| C            | 50-55       | 5           | PASS         |
| RA           | Below 50    | -           | REAPPEARANCE |
| AAA          | -           | -           | ABSENT       |

## 14.2 GRADE SHEET

After results are declared, Grade sheet will be issued to each student which will contain the following details:

- i. The list of courses enrolled during the semester and the grade scored
- ii. The Grade Point Average (**GPA**) for the semester and
- iii. The Cumulative Grade Point Average (**CGPA**) of all courses enrolled from first semester onwards.

**GPA** is the ratio of the sum of the products of the number of Credits (**C**) of courses enrolled and the Grade Points (**GP**) corresponding to the grades scored in those courses, taken for all the courses to the sum of the number of credits of all the courses in the semester.

$$\text{GPA} = \frac{\text{Sum of [C*GP]}}{\text{sum of c}}$$

**CGPA** will be calculated in a similar manner, considering all the courses enrolled from First ~~sem~~ **RA** grade and value added course will be excluded for calculating **GPA** and **CGPA**.

## 14.3 REVALUATION

Revaluation and Re-totalling are allowed on representation. A candidate can apply for revaluation of his/her semester Examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations through the Head of the Department and Dean. A candidate can apply for revaluation of answer scripts for not exceeding 5 subjects at a time. The Controller of Examinations will arrange for the revaluation and the results will be intimated to the candidate through the Head of the Department and Dean. Revaluation is not permitted for Supplementary Examinations, Practical Examinations, Technical Seminars, In-plant Training and Project Work.

## 14.4 TRANSPARENCY AND GRIEVANCE COMMITTEE

A student may get the Photostat copy of the answer script on payment of prescribed fee, if he/she wishes. The students can represent the grievance, if any, to the Grievance Committee, which consists of Dean of the Faculty, (if Dean is HoD, the Dean of another Faculty nominated by the University), HoD of the Department concerned, the faculty of the course and Dean from other discipline nominated by the University and the CoE. If the Committee feels that the grievance is genuine, the script may be sent for external valuation; the marks awarded by the External Examiner will be final. The student has to pay prescribed fee for the same.

## **15. ELIGIBILITY FOR AWARD OF DEGREE**

**A student shall be declared to be eligible for award of Degree if he/she has**

- Successfully gained the required number of total credits as specified in the curriculum corresponding to his/her programme within the stipulated time.
- The award of the degree must be approved by the Board of Management of Karpagam Academy of Higher Education.

## **16. CLASSIFICATION OF THE DEGREE AWARDED**

**16.1** A candidate who qualifies for the award of the Degree (vide Clause 15) having passed the Examination in all the courses in his/her first appearance within the specified minimum number of semesters (vide Clause 5.1) securing a CGPA of not less than **7.5** shall be declared to have passed the Examination in First Class with Distinction.

**16.2** A regular candidate/lateral entrant is eligible to register for B.E. (Honours)/ B.Tech.(Honours), if he/she has passed all the courses in first attempt from first/third semester onwards and holds / maintains a CGPA of 7.5 in III and IV Semester. Prior approval of the concerned Head of the Department and respective Dean for the enrolment into Honours degree before the commencement of V semester is mandatory. A candidate is eligible for the award of BE(Honours) / B.Tech.(Honours), if he/she earns an additional 18 credits by undergoing additional courses over and above the courses prescribed in the respective curriculum. The opted additional courses shall be Emerging / Multidisciplinary /MOOC /NPTEL / KAHE / Industrial offered courses which are related to the major discipline of study. All these 18 credits need to be completed in III year and IV year only. However, if he/she fails to secure 18 additional credits but maintains a CGPA of 7.5 and above is not eligible for Honours degree but eligible for First class with Distinction.

**16.3** A candidate who qualifies for the award of the Degree (vide Clause 15) having passed the Examination in all the courses within the specified minimum number of semesters (vide Clause 5.1) plus one year (two semesters), securing CGPA of not less than 6.5 shall be declared to have passed the Examination in First Class.

**16.4** All other candidates (not covered in Clauses 17) who qualify for the award of the degree (vide Clause 15) shall be declared to have passed the Examination in Second Class.

## **17. SUPPLEMENTARY ESE**

After the publication of VIII semester results, if a student has **ONE** arrear in any theory course of the entire programme, he/she will be permitted to apply within 15 days of the publication of results, and appear for supplementary Examination.

## **18. DISCIPLINE**

Every student is required to observe discipline and decorous behavior both inside and outside the University and not to indulge in any activity which will tend to bring down the prestige of the University. The erring student will be referred to the Disciplinary Committee constituted by the University, to enquire in to acts of indiscipline and recommend to the University about the disciplinary action to be taken.

If a student indulges in malpractice in any of the ESE/CIA he/she shall be liable for punitive action as prescribed by the University from time to time.

## **19. ADVANCED LEARNERS & ON-DEMAND EXAMINATION**

Students

1. Who secure 7.5 CGPA and maintain an attendance of 75% in every semester
2. Clear all the courses in their first appearance itself

are referred to as advanced learners.

When a student fails to maintain any of the above conditions at any given time, he cannot be an advanced learner further.

These advanced learners can request for an on-demand examination for the courses from IV semester onwards. These students on prior permission can appear for such examinations well in advance and complete the entire courses well before the prescribed period of study and can progress for a full time Research Project/Internship/Minor Project during the remaining prescribed period of study. The Internal and External examinations will be conducted for these courses as like the other courses. One or more faculty mentors will be allocated based on the number of students/courses enrolled for the on-demand examination.

Also, these advanced learners can also register for online courses from NPTEL/Swayam/Swayam Plus portals on prior and proper approval from the department. The credits earned from those courses will be transferred to the mark statement of the students.

## **20. REVISION OF REGULATION AND CURRICULUM**

The University may from time-to-time revise, amend or change the Regulations, Scheme of Examinations and syllabi, if found necessary on the recommendations of Board of Studies, Academic Council and Executive council of Karpagam Academy of Higher Education.

## **21. KARPAGAM INNOVATION AND INCUBATION COUNCIL (KIIC)**

### **(A Section 8 Company)**

Based on the 2019 National Innovation and Startup Policy and the 2019–2023 Tamil Nadu Startup Policy, KIIC has recommended to the KAHE students who are affiliated with the KIIC that it be incorporated in the university Program Regulations 2023-24 onwards and implement from this academic year.

#### **21.1 Norms to Student Start-Ups**

- a) Any (UG/PG / (Ph.D.) Research scholars, student, right from the first year of their programme is allowed to setup a startup (or) to work as part time in a startup or work as intern in a startup.
- b) Any (UG/PG / (Ph.D.) Research scholars) student right from the first year of their programme is allowed to earn credit for working on Innovative prototypes/business Models/ Pre incubation (case to case basis). Start Up activities will be evaluated based on the guidelines being given by the expert committee of the KIIC.
- c) Student Entrepreneurs may use the address of incubation center (KIIC) to register their venture while studying in KAHE.
- d) Students engaged in startups affiliated with the KIIC or those who work for them, their attendance may be accepted by KAHE for KAHE's attendance requirements for academic courses under current regulations, up to a maximum of 30% attendance per semester, including claims for ODs and medical emergencies. Potential Students who have been incubated at KIIC may be permitted to take their university semester exams even provided by the KIIC's attendance report, with the proper authorization from the head of the institution.

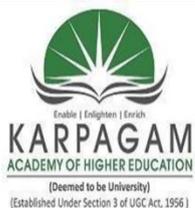
(On case-to-case basis depends upon the applicability strength, societal benefits and quality of the Innovation and Subsequent engagement of the students with the/ her business)

- e) Any Students Innovators/entrepreneurs are allowed to opt their startup in place of mini project/ major project, /seminar and summer training etc. (In plant training, Internship, value added Course.). The area in which the student wishes to launch a Startup may be interdisciplinary or multidisciplinary.
- f) Student's startups are to be evaluated by Expert committee, formed by KIIC and KAHE.

## 22.2 Guide lines to award Credits/ Marks to a Student startup

| S. No. | Description/Startup phases   | In place of the Subject / Course title | Grades/Credits /Marks  |
|--------|--|--|--|
| 1      | Idea stage/Problem Identification                                    | Seminar/Presentation of concept        | Same Marks/ Credits can be awarded that are listed in the course title's curriculum for the respective startup phases. |
| 2      | Proof of Concept (POC) /Solutiondevelopment                          | In-plant training /Internship          |  |
| 3      | Product Development (Lab scale) /Prototype Model/ Company Registered | Mini Project/Value added Course        |  |
| 4      | Validation/Testing   | Main Project phase I                   |  |
| 5      | Business Model / Ready for Commercialization/ Implementation         | Main Project phase II                  |  |

Student's startup stages are divided into five phases and these startup phases can be considered equally in place of the course title as mentioned below with the same credits allotted to the course title in university curriculum.



**KARPAGAM ACADEMY OF HIGHER EDUCATION**  
(Deemed to be University)  
(Established Under Section 3 of UGC Act 1956)  
(Accredited with A+ Grade by NAAC in Second Cycle)  
**FACULTY OF ENGINEERING**

**DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS**

**List of PEOs, POs and PSOs**

**PROGRAMME EDUCATIONAL OBJECTIVES(PEOs):**

- I. To equip well in their professional career by acquiring enough knowledge in the field of Computer Science and Business Systems.
- II. To equip students with strong foundations in Computer Science along with industry-relevant knowledge of Business Systems, enabling them to create technology-driven solutions, enhance employability, foster innovation, and pursue careers or higher studies.
- III. To exhibit communication skills, follow professional ethics and collaborate effectively on teams within global, environmental, societal context.

**PROGRAM OUTCOMES (POS)**

**PO1:** Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

**PO2:** Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

**PO3:** Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

**PO4:** Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

**PO5:** Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

**PO6:** The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

**PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values diversity and inclusion; adhere to national & international laws. (WK9)

**PO8: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

**PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

**PO10: Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

**PO11: Life-Long Learning:** Recognize the need for, and have the preparation and ability for

i) independent and life-long learning

ii) adaptability to new and emerging technologies

and iii) critical thinking in the broadest context of technological change. (WK8)

#### **KNOWLEDGE AND ATTITUDE PROFILE (WK)**

**WK1:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

**WK2:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

**WK3:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

**WK4:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

**WK5:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

**WK6:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

**WK8:** Engagement with selected knowledge in the current research literature of the discipline,

awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

**WK9:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

**PROGRAMME SPECIFIC OUTCOMES(PSOs)**

Engineering Graduates will be able to

- 1) Apply the knowledge of mathematics, science, computer science, and business systems to develop sustainable solutions for complex engineering problems by upholding ethical values to satisfy community and business needs.
- 2) Utilize advanced technologies to solve real-world problems and excel in careers, research, and higher education, in alignment with changing global trends and the pursuit of innovation in business and technology.

**MAPPING:**

| PEO\PO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| PEO I   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |     |     |      | ✓    | ✓    | ✓    |
| PEO II  | ✓   | ✓   | ✓   | ✓   | ✓   |     | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    |
| PEO III | ✓   | ✓   | ✓   |     | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    |

## Annexure I

### Credit Transfer of Online Courses (SWAYAM / NPTEL)

1. The credit transfer shall be applicable to the students of UG programme from 2022 Batch onwards

The proposed conversion from percentage marks given by (SWAYAM NPTEL) to the corresponding grades shall be as follows: -

| <b>NPTEL Course Durations and credit Equivalence</b> |                        |   |
|--|------------------------|---|
| <b>S. NO</b>   | <b>Course Duration</b> | <b>Credit Equivalence for Transfer of Credits</b> |
| 1  | 4 Weeks                | 1 Credit  |
| 2  | 8 Weeks                | 2 Credit  |
| 3  | 12 Weeks               | 3 Credit  |
| 4  | 16 Weeks               | 4 Credit  |

| <b>Type of NPTEL certificate</b> | <b>NPTEL Score</b> | <b>Equivalent Grade (KAHE)</b> | <b>KAHE Score</b> |
|----------------------------------|--------------------|--------------------------------|-------------------|
| Elite + Gold                     | $\geq 90$          | O                              | 91-100            |
| Elite + Silver                   | 75-89              | A+                             | 81-90             |
| Elite                            | 60-74              | A                              | 71-80             |
| Successfully completed           | 40-59              | B+                             | 66-70             |
| No certificate                   | $< 40$             | -                              | -                 |

**Registration / Application form for Credit Transfer of  
SWAYAM-NPTEL / MOOC Courses (Academic Year 2025-2026)**

1. Name of Student: \_\_\_\_\_
2. Register No : \_\_\_\_\_
3. Faculty : 

|  |            |  |              |  |            |  |             |
|--|------------|--|--------------|--|------------|--|-------------|
|  | <b>FOE</b> |  | <b>FASCM</b> |  | <b>FOP</b> |  | <b>FADP</b> |
|--|------------|--|--------------|--|------------|--|-------------|
4. Department/Centre \_\_\_\_\_
5. Name of the programme : \_\_\_\_\_ 5. Year/Semester: \_\_\_\_\_

6. Details of SWAYAM-NPTEL / MOOC Courses:

| S. No. | NPTEL Course Title | Duration (In Weeks) | NPTEL Roll No | Month & Year of Exam | Registered Against |    |    | PE/OE (KAHE Course Code) |
|--------|--------------------|---------------------|---------------|----------------------|--------------------|----|----|--------------------------|
|        |                    |                     |               |                      | PE                 | OE | EX |                          |
|        |                    |                     |               |                      |                    |    |    |                          |
|        |                    |                     |               |                      |                    |    |    |                          |
|        |                    |                     |               |                      |                    |    |    |                          |

**PE: Professional Elective, OE: Open Elective, EX: Extra / add- on Course**

**Declaration by the Student:**

I hereby declare that all the information given by me in this application are true and correct to the best of my knowledge and belief. I will comply with the all rules and regulations of SWAYAM NPTEL/MOOC's courses notified by the Course. I also undertake that after completion of the registered course/s, it's my duty to submit the course completion certificate to HOD otherwise my Marks / Grades shall not be incorporated in Grade Statement of the respective Semester.

**Date:** \_\_\_\_\_

**Signature of candidate**

**For Dean / HoD Office:**

As per the student application and provision in Academic Regulations, the courses of the above student is /are approved for Registration / Transfer of credits:

| Sl. No | Course Title | Registered Apporved |    |    | Semester (I / II / III /IV / V / VI / VII / VIII) | Course Code Assigned | Name of Course Coordinator (If applicable) |
|--------|--------------|---------------------|----|----|---|----------------------|--|
|        |              | PE                  | OE | EX |   |                      |  |
|        |              |                     |    |    |   |                      |  |
|        |              |                     |    |    |   |                      |  |
|        |              |                     |    |    |   |                      |  |

NPTEL Certificate verified by: **Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Approved by:**

**Coordinator**

**HoD**

**Dean**

**For Controller of Examinations Office:**

| NPTEL Course Durations and credit Equivalence<br>(As per Regulation) |                 |  |
|--|-----------------|--|
| S. No  | Course Duration | Credit Equivalence for Transfer of Credits |
| 1  | 4 Weeks         | 1 Credit                                   |
| 2  | 8 Weeks         | 2 Credit                                   |
| 3  | 12 Weeks        | 3 Credit                                   |
| 4  | 16 Weeks        | 4 Credit                                   |

| Type of NPTEL certificate | NPTEL Score | Equivalent Grade (KAHE) | KAHE Score |
|---------------------------|-------------|-------------------------|------------|
| Elite + Gold              | >=90        | O                       | 91-100     |
| Elite +Silver             | 75-89       | A+                      | 81-90      |
| Elite                     | 60-74       | A                       | 71-80      |
| Successfully completed    | 40-59       | B+                      | 66-70      |
| No certificate            | < 40        | -                       | -          |

| S. No | Course Code (KAHE) | Course Title (KAHE) | NPTEL Certificate /Roll No | Duration | Credits | Marks | Grade Awarded |
|-------|--------------------|---------------------|----------------------------|----------|---------|-------|---------------|
|       |                    |                     |                            |          |         |       |               |
|       |                    |                     |                            |          |         |       |               |
|       |                    |                     |                            |          |         |       |               |

**Grades to be incorporated in the Semester:**

|   |    |     |    |   |    |     |      |
|---|----|-----|----|---|----|-----|------|
| I | II | III | IV | V | VI | VII | VIII |
|---|----|-----|----|---|----|-----|------|

**For Scrutiny and Tabulation Section:**

Grades Incorporated in the Semester: \_\_\_\_\_

Grade Awarded: \_\_\_\_\_

**CONTROLLER OF EXAMINATION**

| Course Code           | Name of the course  | Category | Outcomes        |     | Instruction hours/week |          |          | Credits   | Maximum Marks |            |            | Page No |
|-----------------------|---|----------|-----------------|-----|------------------------|----------|----------|-----------|---------------|------------|------------|---------|
|                       |   |          | PO              | PSO | L                      | T        | P        |           | CIA           | ESE        | Total      |         |
|                       |   |          |                 |     |                        |          |          |           | 40            | 60         | 100        |         |
| <b>SEMESTER I</b>     |   |          |                 |     |                        |          |          |           |               |            |            |         |
| 25BTHS102             | Business Communication and Value Science – I                | HS       | 5,7,8,9,11      | 1   | 3                      | 0        | 0        | 3         | 40            | 60         | 100        | 1       |
| 25BTHS104             | Discrete Mathematics  | BS       | 1,2,3,11        | 1   | 3                      | 1        | 0        | 4         | 40            | 60         | 100        | 3       |
| 25BTHS105             | Introductory Topics in Statistics, Probability and Calculus | BS       | 1,2,3,11        | 1   | 3                      | 1        | 0        | 4         | 40            | 60         | 100        | 5       |
| 25BTHS146             | Fundamentals of Physics                                     | BS       | 1,2,3,6,8,11    | 1   | 3                      | 0        | 2        | 4         | 40            | 60         | 100        | 7       |
| 25BTCB141             | Fundamentals of Computer Science                            | ES       | 1,2,3,8,9,11    | 1   | 3                      | 0        | 2        | 4         | 40            | 60         | 100        | 10      |
| 25BEEE142             | Principles of Electrical Engineering                        | ES       | 1,2,3,11        | 1   | 2                      | 0        | 2        | 3         | 40            | 60         | 100        | 13      |
| 25BTMC151G            | Women Safety and Security*                                  | MC       |                 |     | 1                      | 0        | 0        | 0         | 100           | -          | 100        | 16      |
| 25BTMC152G            | தமிழர் மரபும் பண் பாடும் *                                  | MC       |                 |     | 1                      | 0        | 0        | 0         | 100           | -          | 100        | 17      |
| <b>SEMESTER TOTAL</b> |   |          |                 |     | <b>19</b>              | <b>2</b> | <b>6</b> | <b>22</b> | <b>440</b>    | <b>360</b> | <b>800</b> |         |
| Course Code           | Name of the course  | Category | Outcomes        |     | Instruction hours/week |          |          | Credits   | Maximum Marks |            |            | Page No |
|                       |   |          | PO              | PSO | L                      | T        | P        |           | CIA           | ESE        | Total      |         |
|                       |   |          |                 |     |                        |          |          |           | 40            | 60         | 100        |         |
| <b>SEMESTER II</b>    |   |          |                 |     |                        |          |          |           |               |            |            |         |
| 25BTHS203             | Linear Algebra  | BS       | 1,2,3,11        | 1   | 3                      | 1        | 0        | 4         | 40            | 60         | 100        | 19      |
| 25BTCB201             | Fundamentals of Economics                                   | ES       | 1,2,3,8,9,10,11 | 1   | 3                      | 0        | 0        | 3         | 40            | 60         | 100        | 21      |
| 25BTHS241             | Statistical Methods using R Programming                     | BS       | 1,2,3,5,11      | 1   | 3                      | 0        | 2        | 4         | 40            | 60         | 100        | 23      |
| 25BTCB241             | Data Structures and Algorithms                              | PC       | 1,2,3,8,9,11    | 1   | 3                      | 0        | 2        | 4         | 40            | 60         | 100        | 26      |
| 25BEEC244             | Principles of Electronics                                   | ES       | 1,2,3,4,5,11    | 1   | 3                      | 0        | 2        | 4         | 40            | 60         | 100        | 29      |

|                       |  |    |                |   |           |          |           |           |            |            |             |    |
|-----------------------|--|----|----------------|---|-----------|----------|-----------|-----------|------------|------------|-------------|----|
| 25BTHS246G            | Yoga*  | SD |                |   | 1         | 0        | 2         | 2         | 100        | -          | 100         | 32 |
| 25BTCB211             | Python Programming Lab                                 | ES | 1,2,3,4,8,9,11 | 1 | 0         | 0        | 4         | 2         | 40         | 60         | 100         | 33 |
| 25BTHS212             | Business Communication and Value Science -II           | HS | 5,7,8,9,11     | 1 | 0         | 0        | 2         | 1         | 40         | 60         | 100         | 35 |
| 25BTMC251G            | Vedic Mathematics*                                     | MC |                |   | 1         | 0        | 0         | 0         | 100        | -          | 100         | 37 |
| 25BTMC252G            | Essence of Traditional Indian Knowledge and Heritage * | MC |                |   | 1         | 0        | 0         | 0         | 100        | -          | 100         | 38 |
| <b>SEMESTER TOTAL</b> |  |    |                |   | <b>18</b> | <b>1</b> | <b>14</b> | <b>24</b> | <b>580</b> | <b>420</b> | <b>1000</b> |    |

\* Internal Evaluation Only

**COURSE OBJECTIVES**

The goal of this course is to:

- Enhance students' knowledge of grammar and vocabulary to read and write error-free language in real life situations.
- Make the students practice the most common areas of written and spoken communication skills.
- Understand the importance of emotional intelligence and diversity in personal and professional lives.

**COURSE OUTCOMES**

Upon completion of this course, the students will be able to,

- Accomplish a better understanding of advanced grammar rules and frame error-free sentences **P2**
  - Calibrate the language and improve writing skills in academic and social contexts. **P3**
  - Exhibit the basic communication practices in different types of communication. **A2**
  - Build technical writing skills in profession and personal writings. **P2**
  - Integrate the life skills to different situations. **A3**
- \*P- Psychomotor skills, A-Affective Domain Skills**

**UNIT I- Grammar 9**

Parts of speech through context – Tenses: Basic forms and use – Sentence formation, sentence structure - Question formation – Sentence Pattern–Direct Speech– Indirect speech structures – Common errors – Vocabulary: Prefix, Suffix, Abbreviations, Compound words

**UNIT II- Application of Writing Skills 9**

Formal and Informal letter writing- Job application letter- Report writing- Building a Comprehensive Resume- Paragraph and Essay Writing- Summary writing- Memo- Notice- Agenda

**UNIT III- Communication skills 9**

Effective communication and its importance– Verbal and non-verbal communication– Barriers of communication– Listening Skills: Law of nature– Listening and hearing– Types of listening– Etiquettes of telephonic conversation– Ethics of communication– Pronunciation

**UNIT IV- Essentials of technical communication 9**

Email: Formal email– Informal emails– Words from General Service List (GSL) by West– Academic word list (AWL) – Technical specific terms –Phrases– Idioms–Group Discussion– Oral presentation

## UNIT V - Human Values and Interpersonal Skills

9

Self: Assessment and exploration– SWOT– Goal setting: Personal & career– Decision making– Conflict Resolution– What is Inclusion? – Women's contributions in Industry– Sexual harassment– Team work and Time management

**TOTAL: 45 Hours**

### TEXT BOOKS:

1. Kumar Sanjay and Pushp Latha, “English Language and Communication Skills for Engineers”, 1<sup>st</sup> Edition, Oxford University Press, New Delhi, 2018.
2. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, 4<sup>th</sup> Edition Oxford University Press, New Delhi, 2016,
3. Alred, G.J., Brusaw, C.T., & Oliu, W.E. (2011). Handbook of Technical Writing, Tenth Edition, St. Martin's Press, Macmillan, UK Press, 2011.

### REFERENCE BOOKS:

1. Technical Communication – English Skills for Engineers By Meenakshi Raman & Sangeeta Sharma, 1<sup>st</sup> Edition, Oxford University Press, 2009, New Delhi.
2. Joshi, Manmohan and bookboon.com. “SOFT SKILLS”. Vanita J., 1st ed., bookboon.com, 2017.
3. Locker, Kitty O and Stephen Kyo Kaczmarek. "Business Communication: Building Critical Skills, 6<sup>TH</sup> Edition, Mc Craw Hill Education, 2016.
4. Amy S. Wharton. “The Sociology of Gender: An Introduction to Theory and Research”. (Key Themes in Sociology) Blackwell Publishing, UK, Indian Reprint, Kilaso Books, New Delhi, 2005.

### WEB SITES:

1. <https://freelance-writing.lovetoknow.com/kinds-technical-writing>
2. <https://clickhelp.com/clickhelp-technical-writing-blog/11-skills-of-a-good-technical-writer/>
3. <https://www.hult.edu/blog/benefits-challenges-cultural-diversity-workplace/>
4. <https://learnenglish.britishcouncil.org/>

### CO, PO, PSO Mapping

| COs     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1     | -   | -   | -   | -   | 2   | -   | 2   | 2   | 3   | -    | 2    | 1    | -    |
| CO2     | -   | -   | -   | -   | 2   | -   | 2   | 2   | 3   | -    | 2    | 1    | -    |
| CO3     | -   | -   | -   | -   | 2   | -   | 2   | 2   | 3   | -    | 2    | 1    | -    |
| CO4     | -   | -   | -   | -   | 2   | -   | 2   | 2   | 3   | -    | 2    | 1    | -    |
| CO5     | -   | -   | -   | -   | 2   | -   | 2   | 2   | 2   | -    | 2    | 1    | -    |
| Average | -   | -   | -   | -   | 2   | -   | 2   | 2   | 2.8 | -    | 2    | 1    | -    |

1- Low, 2- Medium, 3- High, ‘-’ – No Correlation

**COURSE OBJECTIVES**

The goal of this course is to:

- Develop the knowledge of Boolean algebra to simplify expressions.
- Acquire the knowledge of algebraic structures.
- Provide knowledge in the basic terminologies of Combinatorics and Graphs Theory.
- Understand the concepts of Propositional logic.

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Make use of Karnaugh map to simplify a Boolean expression (K3)
- Identify the concepts of algebraic structures such as groups, rings and fields. (K3)
- Construct generating functions using the principle of mathematical induction. (K3)
- Develop graph networks using graph theory for the given problem. (K3)
- Solve logical problems using propositional logic and rules of inference. (K3)

**UNIT I BOOLEAN ALGEBRA****12**

Introduction of Boolean algebra, Truth table, Basic logic gates, Basic postulates of Boolean algebra, Principle of duality, canonical form, Karnaugh map.

**UNIT II ABSTRACT ALGEBRA****12**

Set, Relation, Groups, sub groups, semi groups and monoids, Lagrange's theorem, definitions and examples of Ring and Fields.

**UNIT III COMBINATORICS****12**

Basic counting, balls and bins problems, Generating functions, Recurrence relations, proof techniques, Principle of mathematical induction, Pigeonhole principle.

**UNIT IV GRAPH THEORY****12**

Graphs, digraph, complement, isomorphism, connectedness and reachability, adjacency Matrix, Eulerian paths and circuits in graphs and digraph, and Hamiltonian paths and circuits in graphs and tournaments, Trees; planar graphs, Euler's formula, dual of a planar graph, independence number and clique number, chromatic number, statement of four color theorem.

**UNIT V LOGIC****12**

Propositional calculus, Propositional equivalence, Propositions and connectives, syntax; Semantics-truth assignments and truth tables, validity and satisfiability, tautology;

adequate set of connectives; Equivalence and normal form; Compactness and resolution; Formal reducibility- natural deduction systems and axiom system; Soundness and completeness.

**TEXT BOOKS:**

1. I.N.Herstein, John Wiley and Sons, Topics in Algebra, 2<sup>nd</sup> edition, 1975.
2. L.Zhongwan, Mathematical Logic for Computer Science, World Scientific, Singapore, 2<sup>nd</sup> edition, 1998.
3. M.Morris Mano, Digital Logic & Computer Design, Pearson, 2004.
4. C.L.Liu Mc Graw Hill, Elements of Discrete Mathematics, (Second Edition) New Delhi.
5. J.A.Bondy and U.S.R.Murty, Graph Theory with Applications, Macmillan Press, 1976.

**REFERENCEBOOKS:**

1. Gilbert Strang, “Introduction to linear algebra”, 5<sup>th</sup> edition, 2016.
2. R.A.Brualdi, “Introductory combinatorics”, North-Holland, New York, 5<sup>th</sup> edition, 2010.
3. Rosen KH, "Discrete Mathematics and its Applications", Tata McGraw Hill Publication Company Limited, New Delhi, Special Indian Edition, 8<sup>th</sup> Edition, 2019.
4. Tremblay JP and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Publication Company Limited, New Delhi, 30<sup>th</sup> Reprint, 2011.

**WEB SITES:**

1. <https://www.investopedia.com/terms/b/boolean-algebra.asp>
2. <https://mathworld.wolfram.com/AbstractAlgebra.html>.
3. [https://onlinecourses.nptel.ac.in/noc20\\_cs82/preview](https://onlinecourses.nptel.ac.in/noc20_cs82/preview)

**CO, PO, PSO Mapping**

| <b>Cos</b>     | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PO11</b> | <b>PSO1</b> | <b>PSO2</b> |
|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| CO1            | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | 1           | 2           |             |
| CO2            | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | 1           | 2           |             |
| CO3            | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | 1           | 2           |             |
| CO4            | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | 1           | 2           |             |
| CO5            | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | 1           | 2           |             |
| <b>Average</b> | <b>3</b>   | <b>2</b>   | <b>1</b>   | -          | -          | -          | -          | -          | -          | -           | <b>1</b>    | <b>2</b>    |             |

**1- Low, 2-Medium, 3 -High, '-' - No Correlation**

**25BTHS105 INTRODUCTORY TOPICS IN STATISTICS, PROBABILITY AND  
CALCULUS**
**4H-4C****Instruction Hours/week: L:3 T:1 P:0****Marks:Internal:40 External:60 Total:100****End Semester Exam:3Hours****COURSE OBJECTIVES**

The goal of this course is for students to:

- Illustrate data effectively using different statistical techniques.
- Impart the knowledge of Measures of central tendency and dispersion.
- Acquaint the basic concepts of probability and its distributions.
- Acquire knowledge in differential and integral calculus.

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Make use of statistical concepts and data collection methods for organizing the data effectively. **(K3)**
- Make use of the data for finding the measures of central tendency and dispersion. **(K3)**
- Apply the basic probability axioms and concepts in their core areas of random phenomena. **(K3)**
- Identify the characteristics of the probability distributions of random variables. **(K3)**
- Utilize the concepts of evaluating double and triple integrals. **(K3)**

**UNIT - I INTRODUCTION TO STATISTICS****12**

Definition of Statistics - Basic objectives - Applications in various branches of science with examples - Collection of Data: Internal and external data - Primary and secondary Data - Population and sample - Representative sample - Classification and tabulation of univariate data - Graphical representation: Frequency curves - Bivariate data: Summarization - marginal and conditional frequency distribution.

**UNIT - II DESCRIPTIVE STATISTICS****12**

Measures of central tendency: Mean – Median - Mode – Measures of dispersion: Quartiles – Quartile deviation – Mean deviation – Standard deviation – Coefficient of variation.

**UNIT - III INTRODUCTION TO PROBABILITY****12**

Concept of experiments, Samples and Events - Definition of Probability – Conditional probability – Bayes theorem – Interpretation - Expected values, moments and variance – Mathematical expectation and its properties – Moments and their properties – Moment generating function.

**UNIT-IV PROBABILITY DISTRIBUTIONS****12**

Discrete distributions: Binomial – Poisson - Geometric distributions – Continuous distribution: Uniform – Exponential – Normal – Chi-square – F- distributions – t- distributions.

**UNIT – V CALCULUS****12**

Basic concepts of Differential calculus – Basic concepts of Integral calculus – Application of double integral: Area – Application of triple integral: Volume.

**TOTAL: 45 + 15 Hours****TEXT BOOKS:**

1. S. M. Ross, Introduction of Probability Models, Academic Press, New York, 10<sup>th</sup> edition, 2010.
2. A. Goon, M. Gupta and B. Dasgupta, Fundamentals of Statistics, Vol. I & II, World Press, 1933.
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, New Delhi, 1965.

**REFERENCE BOOKS**

1. A. M. Mood, F.A. Graybill and D.C. Boes, Introduction to the Theory of Statistics, 3<sup>rd</sup> Edition, Tata Mc Graw Hill Education, 1973.
2. I. R. Miller, J.E. Freund and R. Johnson, Probability and Statistics for Engineers, 9<sup>th</sup> Edition, Pearson Education, 2018.
3. S. M. Ross, A first course in Probability, 10<sup>th</sup> Edition, Pearson Education, 2018.
4. M. D. Greenberg, Advanced Engineering Mathematics, 7<sup>th</sup> Edition, Pearson Education, 2012.

**WEBSITES:**

1. <https://www.khanacademy.org/math/statistics-probability>
2. <https://www.britannica.com/science/probability>
3. <https://www.geeksforgeeks.org/maths/double-integral/>

**CO, PO, PSO Mapping**

| CO No   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1     | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | -    |
| CO2     | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | -    |
| CO3     | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | -    |
| CO4     | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | -    |
| CO5     | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | -    |
| Average | 3.0 | 2.0 | 1.0 | -   | -   | -   | -   | -   | -   | -    | 1.0  | 2.0  | -    |

**1 - Low, 2 - Medium, 3 - High, '-' - No Correlation**

**(i) THEORY****COURSE OBJECTIVES**

The goal of this course is to

- Instil knowledge on physics of quanta, principles of laser, fiber optics and properties of semiconductors.
- Establish a sound grasp of knowledge on the basic principles of heat transfer and electromagnetism for computer applications.
- Understand the fundamentals of waves, optics and oscillations.

**COURSE OUTCOMES**

Upon completion of this course, the students will be able to

- Relate the quantum concepts in quantum computing (K2)
- Apply the performance of light and laser in optical fibers and semiconductors (K3)
- Utilize the basics of heat conduction and thermodynamic laws (K3)
- Make use of the light properties for finding interference (K3)
- Illustrate the properties of particle and its oscillations (K2)

**UNIT I QUANTUM COMPUTING**

Black body radiation - Energy Distribution laws (Qualitative): Stefan Boltzmann's law, Wein's Displacement law-Rayleigh Jeans Law- De Broglie hypothesis - Heisenberg uncertainty principle – physical significance of wave function - Schrödinger's Time dependent wave equation - Schrödinger's Time independent wave equation –Particle in one dimensional box – Introduction to quantum computing – History of quantum computation and quantum information – Quantum bits –Global perspectives – Future directions.

**UNIT II LASER, FIBER OPTICS AND SEMICONDUCTORS**

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: CO<sub>2</sub> and Neodymium lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.

**Semiconductors:** Conductor, Semiconductor and Insulator; Basic concept of Band theory.

### UNIT III THERMODYNAMICS AND ELECTROMAGNETISM

9

Zeroth law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes.

**Electromagnetism:** Continuity equation for current densities – Maxwell’s equations in vacuum and non-conducting medium.

### UNIT II FUNDAMENTALS OF WAVE OPTICS

9

Theory of interference fringes-types of interference-Fresnel’s prism-Newton’s rings, Diffraction-Two kinds of diffraction-Difference between interference and diffraction-Fresnel’s half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence. Polarization - Brewster’s law - double refraction- Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster’s law, double refraction.

### UNIT V OSCILLATION

9

Periodic motion-simple harmonic motion-characteristics of simple harmonic motion – vibration of simple spring mass system. Resonance-definition., damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators.

**Total Hours: 45+30**

#### (ii) LABORATORY

#### LIST OF EXPERIMENTS – PHYSICS

1. Determination of Band gap of a semiconductor.
2. Characteristics of photo diode.
3. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow.
4. Laser- Determination of the wave length of the laser using grating
5. Laser – Determination of Particle size
6. Optical Fiber – Determination of Numerical Aperture and Acceptance angle of the optical fiber
7. Air wedge – Determination of thickness of a thin sheet/wire.

**TOTAL: 30 Hours**

#### TEXT BOOKS

1. Beiser A, Concepts of Modern Physics, Fifth Edition, McGraw Hill International,1995.
2. David Halliday, Robert Resnick, Jearl Walker, Fundamentals of Physics, Twelfth Edition, Wileyplus,2021.

## REFERENCE BOOKS

1. Ajoy Ghatak, Optics, Fifth Edition, Tata McGraw Hill, 2014.
2. Sears and Zemansky, University Physics, Fifth Edition, Addison-Wesley, 2015.
3. Jenkins and White, Fundamentals of Optics, Third Edition, McGraw-Hill, 2017.

## WEB SITES:

1. [www.nptel.ac.in/courses/115102025/](http://www.nptel.ac.in/courses/115102025/)
2. [www.nptel.ac.in/courses/104104085](http://www.nptel.ac.in/courses/104104085)
3. [www.nptel.ac.in/courses/112105123](http://www.nptel.ac.in/courses/112105123)

## CO, PO, PSO Mapping

| COs            | PO1        | PO2        | PO3        | PO4 | PO5 | PO6        | PO7 | PO8        | PO9 | PO10 | PO11       | PSO1       | PSO2 |
|----------------|------------|------------|------------|-----|-----|------------|-----|------------|-----|------|------------|------------|------|
| CO1            | 2          | 1          | -          | -   | -   | 1          | -   | 2          | -   | -    | 1          | 1          | -    |
| CO2            | 3          | 2          | 1          | -   | -   | 1          | -   | 2          | -   | -    | 1          | 1          | -    |
| CO3            | 3          | 2          | -          | -   | -   | 1          | -   | 2          | -   | -    | 1          | 1          | -    |
| CO4            | 3          | 2          | 1          | -   | -   | 1          | -   | 2          | -   | -    | 1          | 1          | -    |
| CO5            | 2          | 1          | -          | -   | -   | 1          | -   | 2          | -   | -    | 1          | 1          | -    |
| <b>Average</b> | <b>2.6</b> | <b>1.8</b> | <b>1.0</b> | -   | -   | <b>1.0</b> | -   | <b>2.0</b> | -   | -    | <b>1.0</b> | <b>1.0</b> | -    |

1- Low, 2- Medium, 3- High, '-' – No Correlation

**PRE-REQUISITES:** Nil**i) THEORY****COURSE OBJECTIVES**

The goal of this course is for students to:

- Understand basic programming constructs, simple algorithms for arithmetic and logical problems.
- Develop C program using, arrays, strings, functions, pointers and structures.
- Learn file handling concepts and Unix System interface in C.

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Apply algorithmic and flowchart techniques to solve computational problems using sequential, decision-making, and looping constructs in C. K3
- Make use of various operators, expressions, and control flow statements to develop structured programs in C. K3
- Develop programs using arrays, strings, and functions with appropriate scope, storage classes, recursion, and preprocessor directives. K3
- Utilize pointers, structures, unions, and command-line arguments effectively for efficient memory management and complex data handling. K3
- Apply file operations in C for text/binary file handling, random access, and integrate low-level Unix system calls for input/output operations. K3

**UNIT-I GENERAL PROBLEM-SOLVING CONCEPTS AND C LANGUAGE****9**

Algorithm and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops Introduction- C Structure- syntax and constructs of ANSI C - Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, proper variable naming and Hungarian Notation - Standard I/O, Formatted Output – printf- Formatted Input – scanf- Statements and Blocks.

**UNIT-II TYPES OF OPERATORS, EXPRESSIONS AND CONTROL FLOW****9**

Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment and Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, IfElse-If, Switch, Loops – while, do, for, break and continue, goto Labels - structured and unstructured programming.

### **UNIT-III ARRAYS, STRINGS AND FUNCTIONS**

**9**

Arrays – string – string operations – functions - types, Basics of functions, parameter passing and returning type, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialization, Recursion, Variable- length argument lists, C Pre-processors, Standard Library Functions and return types.

### **UNIT-IV POINTERS, ARRAYS AND STRUCTURES**

**9**

Pointers and addresses, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional arrays and row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointers to functions, complicated declarations and evaluations - Basic Structures, Structures and Functions, Array of structures, Pointer of Structures, Self-referential Structures, Table look up, Typedef, Unions.

### **UNIT-V FILES IN C AND UNIX SYSTEM INTERFACE**

**9**

File in C: Buffer and Streams – File operations – File Accessing Modes – File I/O functions - Binary and Text file accessing – Random File accessing - Unix system Interface: File Descriptor, Low level I/O – read and write, open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator

**TOTAL: 45 Hours**

### **ii) LABORATORY**

#### **LIST OF EXPERIMENTS:**

List of Experiments

1 Algorithm and flowcharts of small problems like GCD

#### **Structured code writing with:**

2. Small but tricky codes
3. Proper parameter passing
4. Command line Arguments
5. Variable parameter
6. Pointer to functions
7. User defined header
8. Make file utility
9. Multi file program and user defined libraries
10. Interesting substring matching / searching programs
11. Parsing related assignments

**TOTAL: 30 Hours**

#### **TEXT BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, Second Edition, PHI. 2022
2. Byron Gottfried, “Programming with C”, Fourth Edition, McGraw Hill Education, 2018.

#### **REFERENCE BOOKS:**

1. Herbert Schildt, “C: The Complete Reference”, 4<sup>th</sup> Edition, Mc Graw Hill Education, 2019.
2. Yashwant Kanetkar, “Let Us C”, 17<sup>th</sup> Edition, BPB Publications, 2020.

**WEBSITES:**

1. <https://www.programiz.com/c-programming>
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. [https://onlinecourses.nptel.ac.in/noc24\\_cs02/preview](https://onlinecourses.nptel.ac.in/noc24_cs02/preview)

**CO, PO, PSO Mapping**

| CO             | PO1      | PO2      | PO3      | PO4 | PO5 | PO6 | PO7 | PO8      | PO9      | PO10 | PO11     | PSO1     | PSO2 |
|----------------|----------|----------|----------|-----|-----|-----|-----|----------|----------|------|----------|----------|------|
| CO1            | 3        | 2        | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO2            | 3        | 2        | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO3            | 3        | 2        | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO4            | 3        | 2        | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO5            | 3        | 2        | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| <b>Average</b> | <b>3</b> | <b>2</b> | <b>1</b> | -   | -   | -   | -   | <b>2</b> | <b>2</b> | -    | <b>2</b> | <b>2</b> | -    |

**1 - Low, 2 - Medium, 3 - High, '-' - No Correlation**

**PRE-REQUISITES:** Nil**i) THEORY****COURSE OBJECTIVES**

The goal of this course is for students to:

- Understand the basic concepts of electric circuits
- Understand the basic concepts of magnetic circuits.
- Identify the types of sensors and measure quantities in AC and DC systems.

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Solve electrical circuits using Ohm's law and Kirchhoff's laws K3
- Make use of star/delta transformations and network theorems to determine electrical parameters K3
- Apply the concepts of AC fundamentals in RL, RC and RLC circuits. K3
- Understand the basics of electrostatics and electromagnetics. K2
- Compare the working principle of measuring instruments and sensors K2

**UNIT – I INTRODUCTION****6**

Fundamental linear passive and active elements to their functional current-voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff's laws and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy.

**UNIT-II BASIC NETWORK THEOREMS****6**

Current-voltage relations of the electric network by mathematical equations to analyze the network (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem), Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem.

**UNIT-III CONCEPT OF AC CIRCUITS****6**

AC waveform, definitions, form factor, peak factor, phasor representation in polar and rectangular form, R-L, R-C, RLC series and parallel circuits. Concept of impedance, admittance, complex power, power factor, single phase and three phase concepts.

## **UNIT– IV ELECTROSTATICS AND ELECTROMAGNETICS**

**6**

Electrostatic field, electric field strength, concept of permittivity in dielectrics, energy stored in capacitors, charging and discharging of capacitors. Electromagnetism, magnetic field and Faraday's law. Magnetic materials and B-H curve. Self and mutual inductance, Amperes law, Electromechanical energy conversion.

## **UNIT–V MEASUREMENTS AND SENSORS**

**6**

Measuring devices/sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current, Voltage and Power). Concept of indicating and integrating instruments. Electrical Wiring types and accessories, Illumination system, Basic layout of the distribution system, Types of earthing, Safety devices & systems. Battery principles and types.

**TOTAL: 30 Hours**

### **ii) LABORATORY**

#### **LIST OF EXPERIMENTS**

1. Familiarization of electrical circuits: sources, measuring devices and transducers.
2. Determination of resistance temperature coefficient.
3. Verification of Network Theorem (Superposition, Thevenin, Norton, Maximum Power Transfer theorem).
4. Simulation of R-L-C series circuits for  $X_L > X_C$  ,  $X_L < X_C$ .
5. Simulation of Time response of RC circuit.
6. Demonstration of measurement of electrical quantities in DC and AC systems.

**TOTAL: 30 Hours**

#### **TEXT BOOKS:**

1. Electric Machinery,(Sixth Edition) A.E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, Tata McGraw Hill.
2. A Textbook of Electrical Technology,(vol. I),B. L. Theraja, Chand and Company Ltd., New Delhi.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (Second Edition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

**REFERENCE BOOKS:**

1. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2011.
2. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
3. Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.
4. Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.
5. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyammoan S Palli, Tata McGraw Hill, 2010
6. Basic Electrical and Electronics Engineering and Communication Engineering, Muthusubramanian & Salivahanan, , Seventh Edition, Tata McGraw Hill Education Private Limited, 2011.

**CO, PO, PSO Mapping**

| COs            | PO1        | PO2        | PO3      | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1       | PSO2 |
|----------------|------------|------------|----------|-----|-----|-----|-----|-----|-----|------|------|------------|------|
| CO1            | 3          | 2          | 1        | -   | -   | -   | -   | -   | -   | -    | -    | 2          | -    |
| CO2            | 3          | 2          | 1        | -   | -   | -   | -   | -   | -   | -    | -    | 2          | -    |
| CO3            | 3          | 2          | 1        | -   | -   | -   | -   | -   | -   | -    | -    | 2          | -    |
| CO4            | 2          | 1          | -        | -   | -   | -   | -   | -   | -   | -    | -    | 2          | -    |
| CO5            | 2          | 1          | -        | -   | -   | -   | -   | -   | -   | -    | -    | 1          | -    |
| <b>Average</b> | <b>2.6</b> | <b>1.8</b> | <b>1</b> | -   | -   | -   | -   | -   | -   | -    | -    | <b>1.8</b> | -    |

1 - Low, 2 - Medium, 3 - High, -' - No Correlation

**Instruction Hours/week: L:1 T:0 P:0****Marks: Internal:100 Total:100****End Semester Exam: 3 Hours****COURSE OBJECTIVES:**

The goal of this course is for the students to

- Make aware about the practical issues concerning gender and politics.
- Acquaint knowledge about the national policies and programmes and the gendered structures of governance and polity
- Observe the liability of women and women's work in the context of globalization.

**COURSE OUTCOMES:**

Upon completion of this course the students will be able to

- Infer into the basic concepts related to sex, gender, femininity etc.
- Demonstrate the rationale for women's studies
- Compare Gender Equality Issues and Movements in Women's Studies
- Summarize the Social construction of Gender, Gender Roles and Gender stereotyping.
- Illustrate Social Structures, Changing Status of Women in India.

**UNIT I: FUNDAMENTAL CONCEPTS OF WOMEN'S STUDIES****5**

Definition- Objectives of Women's Studies; Importance of Women's Studies; Women's Studies as an Academic Discipline; Role of UGC Centre for Women's Studies

**UNIT II: SOCIAL EMPOWERMENT****5**

Women in Higher Education; Gender issues in Health, Environment, Family welfare Measures, Indecent representation of Women in media; Women in Difficult circumstances; Constitutional.

**UNIT III: POLITICAL EMPOWERMENT****5**

Women leaders in politics- Women in Local Governance- Barriers- Reservation policies- Women's Political Rights, Property Rights - Violence against Women - Women's work

**TOTAL: 15 Hours****TEXT BOOKS:**

1. Amy S. Wharton. (2005). "The Sociology of Gender: An Introduction to Theory and Research". (Key Themes in Sociology) Blackwell Publishing, UK, Indian Reprint, Kilsa Books, New Delhi.
2. Devaki Jain and Pam Rajput (Ed). (2003). "Narratives from the Women's Studies Family: Recreating Knowledge, Sage, and New Delhi.
3. Jasbir Jain (Ed). (2005). "Women in Patriarchy: Cross Cultural". Rawat Publication Jaipur.

25BTMC152G

தமிழர் மரபும் பண்பாடும்

பருவம் -I

1H-0C

கற்பித்தல் நேரம்/வாரம்: L:1 T:0 P:0

மதிப்பெண்: இடைத்தேர்வு: 100

மொத்தம்:100

**பாடத்திட்ட பயன் விளைவு:**

- வரலாற்றிற்கு முற்பட்ட தமிழகத்தை மாணவர்களுக்கு அறிமுகப்படுத்துதல்
- பழந்தமிழர் பண்பாடு சார்ந்த வாழ்க்கை முறையை மாணவர்கள் அறிய ஊக்குவித்தல்
- தமிழ் மொழியின் பழைமையும், திராவிட மொழிகளில் தமிழ்மொழியின் தனிச்சிறப்பையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.
- தமிழர்களின் வாழ்வியல், தமிழர்கலைகள், ஆற்றங்கரைப்பண்பாடுகள் குறித்து மாணவர்கள் அறியச்செய்தல்.
- இந்தியக்குடியரிமைப்பணி முதலான போட்டித்தேர்வுகளில் விருப்பப்பாடமாக இடம்பெறுகின்ற தமிழ்நாகரிகமும் பண்பாடும் குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்

**பாடத்திட்டப் பொதுநோக்கம்:**

- இந்தியக்குடியரிமைப்பணி முதலான போட்டித்தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின்வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப்பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மைவளர்ச்சி. மொழிபெயர்ப்புத்துறை சார்ந்த வேலைவாய்ப்புத்திறன் பெற்றிருத்தல்.

**அலகு:1 தமிழர் மரபு**

மரபு-விளக்கம்-சங்ககால தமிழர் மரபு - திணைப்பகுப்பும் தமிழர் மரபும்-உலகப்பொதுமை - அகத்திணை மரபு - புறத்திணை மரபு- இடைக்காலத்தமிழர் மரபு - பிற்கால மரபும் மாற்றமும் - தற்கால தமிழர்மரபு - வளர்ச்சி.

**அலகு: 2 தமிழர் பண்பாடு**

பண்பாடு - விளக்கம் - பழந்தமிழர் பண்பாடு - இயற்கை சார்ந்த வாழ்வியல் - தமிழர் சமயம் - அரசியல் நிலை-சமூகப் பழக்கவழக்கங்கள் - நம்பிக்கைகள் - வாழ்வியல் அறங்கள் - வணிகம் போன்றவை.

**அலகு:3 தமிழர் கலைகள்**

தமிழகத்தில் கலைகளின் வளர்ச்சி - சிற்பக்கலை வளர்ச்சி -கோயில் கலை - கற்கோவில்கள் - ஓவியக்கலை - அழகுக்கலைகள் - கூத்துக்கலை - மருத்துவக்கலை - நாடகக்கலை- இசைக்கலை போன்றவை.

**அலகு: 4 தமிழர் சமயம்**

பழந்தமிழரின் சமயம் - சங்ககால சமயம் - தொல்காப்பியத்தில் சமயம் - சைவ சமயம்- வைணவம் - தமிழ்ப் பண்பாட்டில் பௌத்தம் - தமிழ்ப் பண்பாட்டில் சமணத்தின் தாக்கம்-தமிழ்ப் பண்பாட்டில் இசுலாம் மற்றும் கிறித்துவ

சமயத்தின் தாக்கம்- தமிழர் பண்பாட்டில் விழாக்கள்- கோயில்களும் விழாக்களும்- சமூக ஒருங்கிணைப்பில் விழாக்களின் பங்கு-சங்க இலக்கியத்தில் விழாக்கள் பற்றிய குறிப்புகள்-இடைக்கால இலக்கியங்களில் விழாக்கள் பற்றிய செய்திகள் - விழாக்களின் சமூகப்பங்களிப்பு - தற்காலத்தில் தமிழர் விழாக்கள் - விளையாட்டும் விழாக்களும்.

### **அலகு: 5 இலக்கியங்களில் தமிழர் பண்பாட்டுப் பதிவுகள்**

சங்க இலக்கியமும் வாழ்வியலும்-திருக்குறளில் வாழ்வியல் நெறிகள் - இரட்டைக் காப்பியங்களும் வாழ்வியலும் - சிற்றிலக்கியங்களில் வாழ்வியல் பதிவுகள்-இக்கால இலக்கியமும் வாழ்வியலும்.

### **பார்வைநூல்கள்:**

1. தமிழ் இலக்கிய வரலாறு - தமிழண்ணல், மீனாட்சி புத்தக நிலையம்- மதுரை- இரண்டாம் பதிப்பு-ஜூலை - 2000.
2. தமிழர் நாகரிகமும் பண்பாடும், அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், சென்னை, திருத்திய பதிப்பு - 2022.
3. தமிழர் வரலாறும் பண்பாடும், நா. வானமாமலை, நியூசெஞ்சுரி புக் ஹவுஸ், சென்னை, ஆறாம் பதிப்பு - 2007 .
4. தமிழக வரலாறு மக்களும் பண்பாடும், கே.கே. பிள்ளை, உலகத் தமிழராய்ச்சி நிறுவனம், சென்னை.

**COURSE OBJECTIVES**

The goal of this course is to:

- Provide the knowledge of matrix algebra techniques for solving the system of equations and finding the Eigen values and Eigen vectors.
- Explore elimination and decomposition techniques for analyzing and solving matrix equations.
- Inculcate the foundations of vector spaces, linear systems and transformations.
- Gain insight into inner products, norms, orthogonality, and their applications in projections and QR decomposition.

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Apply matrix algebra techniques to the system of linear equations. (K3)
- Make use of orthogonal transformation to reduce the quadratic form to canonical form. (K3)
- Utilize vector space concepts for examining linear transformations and their properties. (K3)
- Solve the linear equations using LU decomposition and Gauss elimination methods. (K3)
- Construct orthonormal basis by using Gram Schmidt orthogonalization process. (K3)

**UNIT I MATRICES & DETERMINANTS****12**

Introduction to Matrices and Determinants - Hermitian and unitary matrices - Rank of a matrix - Solution of Linear equations: Cramer's rule - Inverse of a Matrix.

**UNIT II EIGEN VALUES AND EIGEN VECTORS****12**

Eigen Values and Eigen Vectors of a real matrix - Properties of Eigen Values- Reduction of quadratic form to canonical form by orthogonal transformation.

**UNIT III VECTOR SPACES****12**

Vector spaces - Sub spaces - Linear combinations and linear system of equations - Linear independence and linear dependence - Linear Transformations - Basis and dimensions.

**UNIT IV MATRIX DECOMPOSITION****12**

Gaussian Elimination method - LU decomposition - Solving Systems of Linear Equations using the tools of Matrices - QR Decomposition- Positive definite matrix - Singular value decomposition.

**UNIT V PRINCIPAL COMPONENT ANALYSIS****12**

Inner Product, Norms - Principal component analysis- Orthogonality of vectors - Projections - Gram-Schmidt orthogonalization- Application in Image processing and machine learning.

**TEXT BOOKS:**

1. Dennis G. Zill, “Advanced Engineering mathematics”, 7<sup>th</sup> edition, Jones & Bartlett Learning, 2022.
2. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, “Linear Algebra”, Pearson Education, 5<sup>th</sup> Edition, 2018.
3. Gilbert Strang, “Linear Algebra and Learning from Data”, Cambridge University press, 1st Edition, 2019

**REFERENCE BOOKS:**

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 2017.
2. Peter V. O Neil, Advanced Engineering Mathematics, Seventh Edition, Thomson Learning, 2011.
3. Michael. D. Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson, 2002.
4. Gilbert Strang, Introduction to linear algebra, Fifth Edition, ANE Books, 2016.
5. P. N. Wartikar & J. N. Wartikar, Applied Mathematics (Vol. I & II), Pune Vidyarthi Griha Prakashan.
6. R C Gonzalez and R E Woods, Digital Image Processing, Pearson.

**WEB SITES:**

1. [https://onlinecourses.nptel.ac.in/noc24\\_ma88/preview](https://onlinecourses.nptel.ac.in/noc24_ma88/preview)
2. [https://onlinecourses.nptel.ac.in/noc21\\_ma08/preview](https://onlinecourses.nptel.ac.in/noc21_ma08/preview)
3. <https://archive.nptel.ac.in/courses/111/106/111106135/>
4. <https://machinelearningmastery.com/introduction-matrices-machine-learning/>

**CO, PO, PSO Mapping**

| Cos            | PO1      | PO2      | PO3      | PO4      | PO5      | PO6      | PO7      | PO8      | PO9      | PO10     | PO11     | PSO1     | PSO2     |
|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO1            | 3        | 2        | 1        | -        | -        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO2            | 3        | 2        | 1        | -        | -        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO3            | 3        | 2        | 1        | -        | -        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO4            | 3        | 2        | 1        | -        | -        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO5            | 3        | 2        | 1        | -        | -        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| <b>Average</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>-</b> | <b>1</b> | <b>2</b> | <b>-</b> |

**1 - Low, 2 - Medium, 3 - High, '-' - No Correlation**

**(i) THEORY****COURSE OBJECTIVES:**

The goal of this course is to:

- Provide a clear understanding of the fundamental concepts of microeconomics and macroeconomics.
- Learn the ability to use economic principles for analyzing consumer behaviour, production, costs, and market structures.
- Enable to interpret macroeconomic models and policies for understanding national income, money, and economic stability.

**COURSE OUTCOMES:**

Upon completion of this course, the student will be able to:

- Explain the basic concepts of microeconomics and macroeconomics such as demand, supply, production, national income, and money. **K2**
- Identify consumer behaviour using budget lines, indifference curves, and welfare analysis. **K3**
- Apply demand and supply principles to determine equilibrium and effects of government policies. **K3**
- Utilize the concepts of GDP, GNP, NNP, and NDP to measure national income in different contexts. **K3**
- **Apply** the role of the central bank and government in managing unemployment and inflation in the economy. **K3**

**UNIT I – INTRODUCTION TO MICROECONOMICS & DEMAND-SUPPLY ANALYSIS 6**

Principles of Demand and Supply - Demand Curves of Households-Elasticity of Demand: Price, Income, and Cross Elasticities - Supply Curves of Firms - Elasticity of Supply - Market Equilibrium: Determination, Shifts of Curves, and Movements along Curves - Comparative Statics.

**UNIT II - WELFARE ANALYSIS & CONSUMER BEHAVIOUR 6**

Welfare Analysis: Consumer Surplus and Producer Surplus - Price Ceilings and Price Floors - Consumer Behaviour: Axioms of Choice, Budget Constraints and Indifference Curves -Consumer's Equilibrium - Effects of Price Change:Income and Substitution Effects - Derivation of Demand Curve - Applications:Taxes, Subsidies, Intertemporal Consumption, Suppliers' Income Effect.

**UNIT III - THEORY OF PRODUCTION & COSTS 6**

Theory of Production: Production Function, Isoquants, and Returns to Scale - Cost Minimization - Cost Curves: Total, Average, and Marginal Costs - Short-run and Long - run Costs -Firm's Equilibrium under Perfect Competition - Monopoly and Monopolistic Competition.

**UNIT IV - INTRODUCTION TO MACROECONOMICS & NATIONAL INCOME 6**

National Income and its Components: GDP, GNP, NNP, NDP-Circular Flow of Income -Consumption Function & Investment Function-Simple Keynesian Model of Income Determination - Keynesian Multiplier - Government Sector: Role of Taxes and Subsidies-External Sector: Exports and Imports.

**UNIT V – MONEY, IS-LM MODEL & MACROECONOMIC POLICIES 6**

Money: Definitions and Functions - Demand for Money: Transactionary and Speculative Demand - Supply of Money and Bank’s Credit Creation Multiplier - Integration of Money and Commodity Markets: IS-LM Framework-Business Cycles: Phases and Characteristics - Stabilization Policies: Monetary Policy and Fiscal Policy - Role of Central Bank and Government - Classical Paradigm: Price and Wage Rigidities, Voluntary and Involuntary Unemployment.

**TOTAL: 30 HOURS**

**TEXT BOOKS:**

1. Pindyck, Robert S. & Rubinfeld, Daniel L. – *Microeconomics*, Pearson Education, 8<sup>th</sup> Edition, 2023.
2. Richard T. Froyen – *Macroeconomics: Theories and Policies*, Pearson Education, 10<sup>th</sup> Edition, 2013.
3. Samuelson, Paul A. & Nordhaus, William D. – *Economics*, McGraw-Hill, 19<sup>th</sup> Edition, 2009.

**REFERENCE BOOKS:**

1. Varian, Hal R. – *Intermediate Microeconomics: A Modern Approach*, W.W. Norton & Company, 8th Edition, 2010.
2. N. Gregory Mankiw – *Principles of Macroeconomics*, Cengage Learning, 8<sup>th</sup> edition, 2023.
3. Ahuja, H.L. – *Modern Economics*, S. Chand & Company, 20<sup>th</sup> Edition, 2016.

**WEB REFERENCES:**

1. <https://ocw.mit.edu/courses/14-01sc-principles-of-microeconomics-fall-2011/>
2. <https://www.indiabudget.gov.in/economicsurvey/>
3. <https://www.investopedia.com/terms/e/economics.asp>

**CO, PO, PSO Mapping:**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | 2   | 1   | -   | -   | -   | -   | -   | 1   | 1   | 1    | 2    | 1    | -    |
| CO2 | 3   | 2   | 1   | -   | -   | -   | -   | 1   | 1   | 1    | 2    | 1    | -    |
| CO3 | 3   | 2   | 1   | -   | -   | -   | -   | 1   | 1   | 1    | 2    | 1    | -    |
| CO4 | 3   | 2   | 1   | -   | -   | -   | -   | 1   | 1   | 1    | 2    | 1    | -    |
| CO5 | 3   | 2   | 1   | -   | -   | -   | -   | 1   | 1   | 1    | 2    | 1    | -    |
| Avg | 2.8 | 1.8 | 1.0 | -   | -   | -   | -   | 1.0 | 1.0 | 1.0  | 2.0  | 1    | -    |

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

**COURSE OBJECTIVES**

The goal of this course is to:

- Understand the fundamental concepts of sampling distribution for the given data.
- Acquire the basic knowledge of linear statistical models and design of experiments.
- Develop models for given time series data and estimate forecasts using point estimation methods, including maximum likelihood estimation.
- Impart knowledge of hypothesis testing using small and large sample tests

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Utilize stratified random sampling methods to improve the accuracy of parameter estimation. (K3)
- Make use of sampling techniques and linear statistical models for estimating the population parameters and relationships between variables. (K3)
- Develop point estimators using maximum likelihood estimation. (K3)
- Identify the hypothesis tests for small and large sample cases to make accurate statistical inferences. (K3)
- Apply non-parametric tests for analysing the data and forecasting time series analysis using ARIMA models. (K3)

**UNIT I SAMPLING TECHNIQUES**

9

Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement) Sampling distribution of sample mean, stratified random sampling

**UNIT II LINEAR STATISTICAL MODELS AND DESIGN OF EXPERIMENTS**

9

Scatter diagram – Linear Regression and Correlation - Least squares method - Rank correlation - Standard multiple regression models with emphasis on detection of collinearity, outliers, non-normality and autocorrelation, Validation of model assumptions. Multiple correlation, Analysis of variance (ANOVA): One way and Two way classifications

**UNIT III ESTIMATION THEORY**

9

Point estimation, criteria for good estimates (Unbiasedness, Consistency)– Method estimation including Maximum likelihood estimation. Sufficient statistic- concept and examples, complete sufficiency, their application in estimation.

#### **UNIT IV TESTING OF HYPOTHESIS**

**9**

Concept & formulation, Type I and Type II errors, Neyman Pearson Lemma. Large Sample tests based on normal distribution – Test for single mean – Difference between means – Proportion – Difference between proportions – Small sample test – Student-t – t Test for single mean - Difference between means – Snedecor’s F test – Chi-square test for goodness of fit – Independence of attributes

#### **UNIT V NON-PARAMETRIC INFERENCE AND TIME SERIES ANALYSIS**

**9**

Non-parametric Inference: Comparison with parametric inference – Use of order statistics - Sign test – Wilcoxon signed rank test – Mann-Whitney Test – Run test, Kolmogorov-Smirnov test, Spearman’s and Kendall’s test. Basics of Time Series Analysis- Stationary - ARIMA Models: Least Square method and maximum likelihood Identification - Estimation – Forecasting.

**TOTAL: 45 Hours**

#### **LIST OF THE EXPERIMENTS:**

1. Reading in and Writing Data, Working with Data, Manipulating Data
2. Functions, Control Flow statements and Loops
3. Creating and manipulating vectors and matrices
4. Simulation, Linear Model and Data Frame
5. Graphics in R
6. Fitting the multiple regression
7. Hypothesis Testing Z-test
8. Hypothesis Testing t Test and F Test
9. Hypothesis Testing Chi -Square Test
10. Building ARIMA Models

**TOTAL: 30 Hours**

#### **TEXT BOOKS:**

1. I.R. Miller, J.E. Freund and R. Johnson, “Probability and Statistics for Engineers “, Ninth Edition, Pearson,2020
2. A. Goon, M. Gupta and B. Dasgupta, “Fundamentals of Statistics”, Vol. I and Vol. II, World Press, 2016.
3. S. C. Gupta, V. K. Kapoor, Fundamentals of Mathematical Statistics, Tenth Edition, Sultan Chand & Sons, 2002.
4. The Analysis of Time series: An Introduction, ChrisChatfield,6<sup>th</sup> edition, CRC press,2017.

#### **REFERENCE BOOKS:**

1. Introduction of the Theory of Statistics, A.M.Mood, F.A. Graybill and D.C. Boes, McGrawHill, India edition,2017
2. Steven M. Kay, Fundamentals of Statistical Signal Processing: Estimation Theory, Vol I, Pearson, 2010.
3. D.C. Montgomery and E. Peck, Introduction to Linear Regression Analysis, Third Edition, Wiley, 2010
4. Garrett Grolemond, Hands-on Programming with R, Shroff Publishers & Distributors Pvt Ltd, 2018.
5. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Second edition-2018.

#### **WEBSITES:**

1. [https://onlinecourses.nptel.ac.in/noc24\\_ma46](https://onlinecourses.nptel.ac.in/noc24_ma46)
2. [https://onlinecourses.swayam2.ac.in/cec24\\_ma03](https://onlinecourses.swayam2.ac.in/cec24_ma03)
3. <https://www.geeksforgeeks.org/maths/estimation-in-statistics/>
4. <https://learningstatisticswithr.com//book/hypothesis-testing.html>
5. <https://online.stst.psu.edu/stat415/lesson/26/26.1.pdf>

### CO, PO, PSO Mapping

| CO      | PO1      | PO2      | PO3      | PO4      | PO5      | PO6      | PO7      | PO8      | PO9      | PO10     | PO11     | PSO1     | PSO2     |
|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO1     | 3        | 2        | 1        | -        | 1        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO2     | 3        | 2        | 1        | -        | 1        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO3     | 3        | 2        | 1        | -        | 1        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO4     | 3        | 2        | 1        | -        | 1        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| CO5     | 3        | 2        | 1        | -        | 1        | -        | -        | -        | -        | -        | 1        | 2        | -        |
| Average | <b>3</b> | <b>2</b> | <b>1</b> | <b>-</b> | <b>1</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>1</b> | <b>2</b> | <b>-</b> |

**1- Low, 2- Medium, 3- High, '-' – No Correlation**

**PRE-REQUISITES:** Fundamentals of Computer Science**i) THEORY****COURSE OBJECTIVES**

The goal of this course is for students to:

- Learn about basic terms, searching techniques, sorting and Hashing
- Gain Knowledge in linear and nonlinear its applications.
- Able to incorporate various techniques in real time scenarios.

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

- Explain algorithmic fundamentals, recursion, performance analysis, and asymptotic notations. K2
- Apply linear data structures arrays, stacks, queues, and linked lists to solve computational problems. K3
- Apply non-linear data structures trees and graphs to solve problems. K3
- Utilize searching and sorting techniques, and assess their efficiency for different data structures. K3
- Make use of file organization techniques and graph traversal algorithms in real-world applications. K3

**UNIT-I BASIC TERMINOLOGIES AND INTRODUCTION TO ALGORITHM AND DATA ORGANISATION 9**

Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction

**UNIT-II LINEAR DATA STRUCTURE 9**

Array, Stack, Queue, Linked-list and its types, Various Representations, Operations &amp; Applications of Linear Data Structures

**UNIT-III NON-LINEAR DATA STRUCTURE 9**

Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B &amp; B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations &amp; Applications of Non-Linear Data Structures

**UNIT-IV SEARCHING AND SORTING ON VARIOUS DATA STRUCTURES 9**

Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heap sort, Introduction to Hashing

## UNIT-V FILE AND GRAPH

9

Organisation (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes. Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

**TOTAL: 45 Hours**

### ii) LABORATORY

#### LIST OF EXPERIMENTS:

1. Implementations of Stack and Queue
2. Applications of Stack and Queue (Tower of Hanoi, Infix, Postfix and Prefix Conversion, Expression Evaluation)
3. Implementations of Singly, Doubly and Circular List
4. Implementation of reading, writing and addition of Polynomials.
5. Implementation of Line editor with line count, word count showing on the screen.
6. Implementations Binary Search Tree and AVL Tree (All Operations)
7. Implementation of BFS and DFS
8. Implementation of B-Trees.
9. Linear and Binary Search Operations
10. Implementation of Bubble Sort, Quick and Merge Sort.
11. Implementation of Disjoint set.
12. Implementation of Hashing Techniques
13. Saving / retrieving non-linear data structure in/from a file

**TOTAL: 30 Hours**

#### TEXT BOOKS:

1. E. Horowitz, S. Sahni, S. A-Freed, "Fundamentals of Data Structures", Third Edition, Computer Sciences Press, 2013.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Fourth Edition, Pearson Education, 2018

#### REFERENCE BOOKS:

1. Donald E. Knuth, "The Art of Computer Programming: Fundamental Algorithms", Volume 1.
2. Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms".
3. Pat Morin, "Open Data Structures: An Introduction (Open Paths to Enriched Learning)", 31st ed. Edition.

#### WEBSITES:

1. <https://nptel.ac.in/courses/106102064>
2. [www.coursera.org/learn/data-structures](http://www.coursera.org/learn/data-structures)
3. [www.cs.usfca.edu/~galles/visualization/Algorithms.html](http://www.cs.usfca.edu/~galles/visualization/Algorithms.html)

### CO, PO, PSO Mapping

| CO             | PO1        | PO2        | PO3      | PO4 | PO5 | PO6 | PO7 | PO8      | PO9      | PO10 | PO11     | PSO1     | PSO2 |
|----------------|------------|------------|----------|-----|-----|-----|-----|----------|----------|------|----------|----------|------|
| CO1            | 2          | 1          | -        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO2            | 3          | 2          | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO3            | 3          | 2          | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO4            | 3          | 2          | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO5            | 3          | 2          | 1        | -   | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| <b>Average</b> | <b>2.8</b> | <b>1.8</b> | <b>1</b> | -   | -   | -   | -   | <b>2</b> | <b>2</b> | -    | <b>2</b> | <b>2</b> | -    |

**1 - Low, 2 - Medium, 3 - High, '-' - No Correlation**

**PREREQUISITE: NIL****i) THEORY****COURSE OBJECTIVES:**

The goal of this course for students is to:

- Provide the fundamental skills to understand the basic of semiconductor and components like diode, transistor, operational amplifier and logic gates
- Impart practical experience in the field of Electronics.

**COURSE OUTCOMES:**

At the end of this course students will be able to:

- Interpret energy band diagrams for semiconductor junctions. K2
- Explain the behavior of diodes based on their characteristics K2
- Apply transistor concepts to design basic circuits. K3
- Illustrate the working of operational amplifiers in inverting and non-inverting modes. K2
- Identify the use of digital components in basic sequential and combinational logic circuits K3

**UNIT I INTRODUCTORY IDEA OF SEMICONDUCTORS****9**

Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone. Formation of PNP / NPN junctions, energy band diagram.

**UNIT II DIODES AND DIODE CIRCUITS****9**

V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

**UNIT III TRANSISTORS AND TRANSISTOR CIRCUITS****9**

Transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles

**UNIT IV OPERATIONAL AMPLIFIER BASICS****9**

Introduction to integrated circuits, operational amplifier and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Proportional, Integral, Derivative circuits.

**UNIT V BASIC IDEAS OF DIGITAL ELECTRONICS****9**

Basic idea of switching circuit, Realization of Logic gates, multiplexers and demultiplexers, Flip flop, Registers and Counters.

**TOTAL: 45 Hours****(ii) LABORATORY****LIST OF EXPERIMENTS:**

1. V-I characteristics of PN junction diode.
2. Input-output characteristics of CE configuration of transistor.
3. Biasing techniques of transistor- to find stability factor of self-bias, collector to base bias, fixed bias circuits.
4. OP-AMP circuits: Inverting and Non-inverting Amplifier.
5. Basic logic gates and De-Morgan's Theorem.
6. Multiplexer and Demultiplexer.

**Text Books:**

1. Adel S. Sedra and Kenneth Carless Smith, Microelectronics Circuits, Oxford University Press, 2016
2. Jacob Millman, Christos Halkias, Millman's Integrated Electronics, Chetan Parikh, McGraw Hill Education, 2017
3. M. Morris Mano, Digital Logic & Computer Design, Pearson India, 2017

**Reference Books:**

1. Robert Boylestead, Louis Nashelsky, "Electronic Devices and Circuit Theory" Pearson Education, 2012
2. Ben Streetman, Sanjay Banerjee, Solid State Electronic Devices, 6th Edition, Prentice-Hall, Inc. 2006
3. Albert Paul Malvino, Electronic Principle, 7th Edition, McGraw Hill Education, 2017
4. D Schilling C Belove T Apelewicz RSaccardi, Electronics Circuits: Discrete & Integrated, McGraw Hill Education, 2002
5. Jacob Millman, Arvin Grabel. Microelectronics, McGraw Hill Education, 2017

**CO, PO, PSO Mapping:**

| <b>COs</b>     | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PO11</b> | <b>PSO1</b> | <b>PSO2</b> |
|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <b>CO1</b>     | 2          | 1          | -          | -          | 2          | -          | -          | -          | -          | -           | 1           | 1           | -           |
| <b>CO2</b>     | 2          | 1          | -          | -          | 2          | -          | -          | -          | -          | -           | 1           | 1           | -           |
| <b>CO3</b>     | 3          | 2          | 1          | -          | 2          | -          | -          | -          | -          | -           | 1           | 1           | -           |
| <b>CO4</b>     | 2          | 2          | 1          | -          | 2          | -          | -          | -          | -          | -           | 1           | 1           | -           |
| <b>CO5</b>     | 3          | 2          | 1          | 1          | 2          | -          | -          | -          | -          | -           | 1           | 1           | -           |
| <b>Average</b> | <b>2.4</b> | <b>1.6</b> | <b>1</b>   | <b>1</b>   | <b>2</b>   | <b>-</b>   | <b>-</b>   | <b>-</b>   | <b>-</b>   | <b>-</b>    | <b>1</b>    | <b>1</b>    | <b>-</b>    |

**1 - Low, 2 - Medium, 3 - High, '-' - No Correlation**

**COURSE OBJECTIVES**

The goal of this course is for the students to:

- Have knowledge of Physical fitness and exercise management to lead better quality life
- Enable to officiate, supervise various sports events and organize sports events
- Acquire the knowledge of Physical Education, Sports and Yoga and understand the purpose and its development
- Gain knowledge to plan, organize and execute sports events

**COURSE OUTCOMES**

Upon completion of this course the students will be able to:

- Practice physical activities and yoga for strength, flexibility and relaxation.
- Use techniques for increasing concentration and decreasing anxiety for stronger academic performance.
- Perform yoga exercises in various combination and forms.
- Improve personal fitness through participation in sports and yoga activities.
- Follow sound nutritional practices for maintaining good health and physical performance.

**UNIT I INTRODUCTION TO PHYSICAL FITNESS**

Explain importance of physical education - Describe importance of Physical Fitness & Wellness - Explain the components of physical fitness - Demonstrate healthy life style -Prevent health threats by changing life style

**UNIT II FUNDAMENTALS OF ANATOMY & PHYSIOLOGY IN SPORTS & YOGA**

Explain importance of anatomy and physiology - Describe effects of exercise in various body systems - Describe concept of correct posture - Explain corrective measures for posture deformities.

**UNIT III YOGA & PRANAYAMA**

Explain importance of yoga - Perform various pranayama for increasing concentration - Use meditation and other relaxation techniques for improving concentration.

**TEXT BOOKS**

1. Ajmer Singh, Modern Trends and Physical Education class 11 & class 12, KalyaniPublication, New Delhi
2. B.K.S. Iyengar, Light on Yoga, Thomson's Publication, New Delhi,
3. V.K.Sharma, Health and Physical Education, NCERT Books; Class11,12Saraswati House Publication, New Delhi
4. Acharya Yatendra, Yoga and Stress Management, Fingerprint Publishing
5. Swami Vivekanand, PatanjaliYogaSutras, Fingerprint PublishingISBN:9389567351.
6. Ramdev, PranayamRahasya, Patanjali-DivyaPrakashan, HaridwarISBN:978-8189235017
7. Ramdev, Yogait'sPhilosophy&Practice, DivyaPrakashan,Haridwar.

**PREREQUISITE: NIL****COURSE OBJECTIVES:**

The goal of this course for the students is to:

- Learn the basics of Python Programming, Control statements, Numpy, Pandas, SciPy modules.
- Demonstrate various Python data structures like Lists, Tuples, Sets and dictionaries file handling using Python.
- Understand about Strings, Functions, Modules and Regular Expressions in Python Programming.

**COURSE OUTCOMES:**

Upon Completion of this course the students will be able to:

- Utilize the basics of Python Programming in problem solving and conditionals and loops. K3
- Apply Python Data structures List, Sets, Tuples, Dictionary for Compound Data. K3
- Make use of Strings, Functions, Modules and Regular Expressions in Python Programming. K3
- Develop python programming using file handling and Exceptional handling. K3
- Apply Numpy, Pandas and SciPy for numerical and statistical data. K3

**LIST OF EXPERIMENTS:**

1. Experiments based on Variables, Datatypes and Operators in Python.
2. Implement various control statements in python.
3. Implement various String and List operations.
4. Implement inbuilt functions, User-defined functions and Lambda functions.
5. Implementation of Tuples, sets, Dictionary and its operations.
6. Implementation of Exception Handling and I/O files.
7. Experiments based on Packages: math, datetime, platform, re
8. Experiments based on Packages: NumPy, pandas, matplotlib
9. Experiments based on Packages: collections
10. Experiments based on Packages: SciPy
11. Mini Project

**TOTAL: 60 Hours****TEXT BOOKS:**

1. Allen B Downey, Jeffrey Elkne, Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python3 Documentation", 3rd Edition, Green Tea Press, 2020.
2. Steven F. Lott, Dusty Phillips, "Python Object-Oriented Programming: Build robust and maintainable object-oriented Python applications and libraries" 4th Edition, Packt Publishing Limited, 2021.

**REFERENCE BOOKS:**

1. R. Nageswara Rao, "Core Python Programming", 3rd Edition, Dream tech Press, 2022.
2. Mark Lutz, "Learning Python", 5th Edition, O'Reilly Publication, 2018.
3. Mark and Summerfield, "Programming in Python 3", 2nd Edition, Dorling Kindersley India Pvt. Ltd, 2019.

**WEB SITES:**

1. <https://www.python.org/shell/>
2. <https://python-iitk.vlabs.ac.in/>
3. <https://www.hackerrank.com/domains/python>

**CO, PO, PSO Mapping**

| CO             | PO1      | PO2      | PO3      | PO4      | PO5 | PO6 | PO7 | PO8      | PO9      | PO10 | PO11     | PSO1     | PSO2 |
|----------------|----------|----------|----------|----------|-----|-----|-----|----------|----------|------|----------|----------|------|
| CO1            | 3        | 2        | 1        | -        | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO2            | 3        | 2        | 1        | -        | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO3            | 3        | 2        | 1        | -        | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO4            | 3        | 2        | 1        | -        | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| CO5            | 3        | 2        | 1        | 1        | -   | -   | -   | 2        | 2        | -    | 2        | 2        | -    |
| <b>Average</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>1</b> | -   | -   | -   | <b>2</b> | <b>2</b> | -    | <b>2</b> | <b>2</b> | -    |

**1 - Low, 2 - Medium, 3 - High, '-' - No Correlation**

Instruction Hours/week: L:0 T:0 P:2

Internal: 40 External:60 Total:100

End Semester Exam: 3 Hours

**COURSE OBJECTIVES:**

The goal of this course is;

- To develop effective oral communication skills by practicing expression of ideas, engaging in social exchanges, and delivering structured speeches in formal settings.
- To enhance professional communication abilities through mastering polite questioning, responding appropriately, and applying proper etiquette in various communication channels.
- To build proficiency in organizing and presenting information clearly by utilizing descriptive techniques and creating structured written materials related to practical, real-world situations.

**COURSE OUTCOMES:**

Learners will be able to:

- Demonstrate the ability to communicate effectively in both individual and group interactions. A2
- Build clear and professional communication by asking questions and using proper etiquette. P2
- Exhibit accurate completion of formal documents and effective use of communication strategies in structured arguments. A2
- Perform organized descriptions and formal event roles accurately using visual aids and appropriate language. P3
- Excel expertly in delivering structured presentations and reviewing movies and documentaries with precision. P3

**\*P-Psychomotor Skills, A- Affective Domain Skills****LIST OF EXPERIMENTS:**

| S.No. | SKILLS          | TOPICS  |
|-------|-----------------|---|
| 1     | Speaking        | Self-Introduction   |
| 2     | Teamwork        | Group Discussion (offering opinions, disagreeing politely, accepting opinions)  |
| 3     | Public speaking | Asking questions and answering (Professional communication, politeness markers) |
| 4     | Listening       | Dialogues from TV/radio/Ted talk/Podcast  |
| 5     | Language Ethics | Communication etiquette (Telephone, E-mail)                                     |
| 6     | Reading         | Reading for detail, global understanding  |
| 7     | Speaking        | Seminar/Presentation  |

|    |           |                                  |
|----|-----------|----------------------------------|
| 8  | Listening | Debate                           |
| 9  | Listening | Listening for gist               |
| 10 | Reading   | Reading different genres         |
| 11 | Listening | Listen and respond appropriately |
| 12 | Writing   | Create Magazine                  |

**TOTAL:30 HOURS**

**CO, PO, PSO Mapping**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5      | PO6 | PO7      | PO8 | PO9 | PO10 | PO11     | PSO1 | PSO2 |
|----------------|-----|-----|-----|-----|----------|-----|----------|-----|-----|------|----------|------|------|
| CO1            | -   | -   | -   | -   | 2        | -   | 2        | 3   | 3   | -    | 2        | 1    | -    |
| CO2            | -   | -   | -   | -   | 2        | -   | 2        | 3   | 3   | -    | 2        | 1    | -    |
| CO3            | -   | -   | -   | -   | 2        | -   | 2        | 3   | 3   | -    | 2        | 1    | -    |
| CO4            | -   | -   | -   | -   | 2        | -   | 2        | 3   | 3   | -    | 2        | 1    | -    |
| CO5            | -   | -   | -   | -   | 2        | -   | 2        | 3   | 3   | -    | 2        | 1    | -    |
| <b>Average</b> | -   | -   | -   | -   | <b>2</b> | -   | <b>2</b> | 3   | 3   | -    | <b>2</b> | 1    | -    |

**1- Low, 2- Medium, 3- High, '-' – No Correlation**

**COURSE OBJECTIVES:**

The goal of this course is to:

- Overcome the fear of maths, acquire knowledge in Logical thinking, increase concentration and improve critical thinking.
- Build the skill to perform basic math fast and accurately with confidence.
- Enhance computation skills through Vedic Mathematics

**COURSE OUTCOMES:**

Upon completion of this course, the student will be able to:

- Apply Vedic sutras for arithmetic computation. K3
- Utilize Urdhva Tiryagbhyam for solving complex multiplication problems. K3
- Make use of Vedic division method for basic word problems. K3

**UNIT I**

5

Application of vedic sutras, Arithmetic computation, Shudh method for a list of number, Rapid Addition- Single to Double-Digit, Subtraction using Nikliam 3 Digit

**UNIT II**

5

Multiplication by Thumb Rule, Multiplication Vertically and cross wise, Urdhva tiryagbhyam, Anurupyena.

**UNIT III**

5

Squaring numbers, Traditional Division, Straight Division, Facts of Division, Basic Word Problems.

**TOTAL: 15 Hours**

**REFERENCES:**

1. Jagadguru swami sri Bharathi krsnatirthaji maharaja, "Vedic Mathematics", International Best seller, New Revised Edition.
2. Sri Bharati Krsna Tirthaji, "Vedic Mathematics", published by Motilal Banarsidass, 1965.
3. Williams K.R. "Discover Vedic Mathematics." Vedic Mathematics Research Group, 1984.
4. Rajesh Kumar Thakur, "Advanced Vedic Mathematics", Rupa Publications India Pvt. Ltd 2019.

**WEBSITES:**

1. [www.nptel.ac.in/courses/111101080](http://www.nptel.ac.in/courses/111101080)
2. [www.https://vedicmathworld.com/](https://vedicmathworld.com/)

**COURSE OBJECTIVES**

The goal of this course for the students is to:

- Impart a holistic understanding about Indian Culture and Thoughts from a Historical perspective.
- Encourage critical appreciation of the Indian thoughts and cultural manifestations.
- Gain knowledge of Indian heritage and cultural heritage on various epistemological inquiries.

**COURSE OUTCOMES**

Upon completion of this course the students will be able to:

- Understand the cultural diversity
- Infer the need of cultural unity
- Know the Dravidian culture
- Realize the power of Indian educational system called gurukul
- Come to know the concepts of vedic thought

**UNIT I INTRODUCTION TO INDIAN THOUGHT AND CULTURE 5**

Plurality of Indian Culture - Cultural Diversity and Cultural Unity -Different Manifestations of Indian Culture: Indus Valley culture -Vedic Culture and Dravidian culture.-The Medieval Bhakti Culture

**UNIT II TRADITIONAL KNOWLEDGE SYSTEMS OF INDIA 5**

Introduction to the Traditional Indian Education System of Gurukul - Parampara - Understanding Indian Philosophy: Vedic Thought and the nine schools of Philosophy - Indigenous Knowledge and Women in India

**UN III PROTECTION OF TRADITIONAL KNOWLEDGE 5**

Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, the value of TK in the global economy, Role of Government to harness TK.

**TEXTBOOKS:**

1. Chatterjee, Satishchandra, and Dhirendramohan Datta. (2007) Introduction to Indian Philosophy. Rupa Publications, New Delhi.
2. Husain,S. Abid. (2003). The National Culture of India. National Book Trust, New Delhi.