

# ACHARIYA

**COLLEGE OF ENGINEERING TECHNOLOGY**

*AN AUTONOMOUS INSTITUTION*

*(Approved by AICTE, New Delhi, and affiliated to Pondicherry University)*

*Accredited by NAAC & ISO 9001:2008 Certified Institution*

**Pondicherry – 605010**



**Curriculum and Syllabus**

**for**

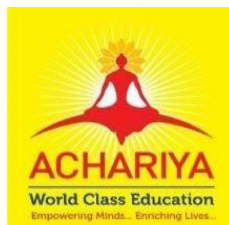
**B. Tech. Computer Science and Engineering**

*(IOT including Cyber Security and Blockchain Technology)*

**REGULATION - 2026**

**(Effective from Academic year 2026-27)**

**(Subject to the Approval of the First Academic Council meeting of Achariya College of Engineering Technology)**



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**(IOT including Cyber Security and Blockchain Technology)**

**ACHARIYA COLLEGE OF ENGINEERING TECHNOLOGY**

## **COLLEGE VISION & MISSION**

### **VISION:**

To be a center of excellence in technical education, producing globally competent and ethically strong engineering professionals who contribute to the development of society and nation.

### **MISSION:**

1. Provide high-quality engineering education through state-of-the-art infrastructure.
2. Foster innovation, research, and entrepreneurship among students.
3. Maintain lifelong connection with alumni and industry partners.
4. Inculcate moral values and psychological well-being.

## **DEPARTMENT VISION & MISSION**

### **VISION:**

To develop a competent professional, a leader, and an innovator in the field of ever-changing technologies by inculcating knowledge with ethical standards, thereby contributing to global society.

### **MISSION:**

The Department endeavors to

1. Aspire for academic excellence by imparting knowledge of computer science and Engineering (IOT including Cyber Security and Blockchain Technology).
2. Provide a learning environment that helps students to excel in Embedded security, edge computing and cryptography.
3. Motivate and facilitate learning, unlearning, and relearning, and bring out the best in each and every individual.
4. Inculcate moral values and empower the students to attain administrative and leadership skills for the betterment of society.

## **CURRICULUM AND SYLLABUS**

The Curriculum of B.Tech. Computer Science and Engineering (IOT including Cyber Security and Blockchain Technology) is designed to fulfil the Program Educational Objectives (PEO) and the Program Outcomes (PO) listed below.

### **PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

|             |                                                                                                                                                                                                                                                                   |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PEO1</b> | <b>PROFESSIONAL COMPETENCE:</b><br><br>Graduates will apply the knowledge and skills acquired during their education to analyse, design and implement computer-based systems, demonstrating competence in their chosen field of computer science and engineering. |
| <b>PEO2</b> | <b>ENTREPRENEURSHIP AND INNOVATION:</b><br><br>Graduates will apply creativity and innovation in problem-solving and exhibit an entrepreneurial mindset, potentially leading to the creation of new products, services or businesses.                             |
| <b>PEO3</b> | <b>CONTRIBUTION TO RESEARCH AND DEVELOPMENT:</b><br><br>Graduates will contribute to the advancement of knowledge in computer science and engineering through research, publications or involvement in research and development activities.                       |
| <b>PEO4</b> | <b>ENGAGEMENT WITH THE COMMUNITY:</b><br><br>Graduates will actively participate in community and professional activities, sharing their expertise and contributing to the betterment of the community and the profession.                                        |

### **PROGRAM OUTCOMES (PO)**

|            |                                          |                                                                                                                                                                                                                                                                                      |
|------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PO1</b> | <b>Engineering Knowledge</b>             | Apply the 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                                                        |
| <b>PO2</b> | <b>Problem Analysis</b>                  | Identify, formulate review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development (WK1-WK4)                                                                                                  |
| <b>PO3</b> | <b>Design / Development of solutions</b> | 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) |
| <b>PO4</b> | <b>Conduct Investigations</b>            | Conduct investigations of complex engineering problems using research-based knowledge including design of experiments,                                                                                                                                                               |

|             |                                               |                                                                                                                                                                                                                                                                              |
|-------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | <b>of complex problems</b>                    | modelling, analysis and interpretation of data to provide valid conclusions (WK8).                                                                                                                                                                                           |
| <b>PO5</b>  | <b>Engineering Tool Usage</b>                 | Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems (WK2 & WK6).                                                          |
| <b>PO6</b>  | <b>The Engineer and the world</b>             | Analyse 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).                                  |
| <b>PO7</b>  | <b>Ethics</b>                                 | Apply ethical principles and commit to professional ethics, human values. 4 Diversity and inclusion, adhere to national and international laws (WK9).                                                                                                                        |
| <b>PO8</b>  | <b>Individual and Collaborative Team Work</b> | Function effectively as an individual, and as a member or leader in diverse / multi-disciplinary teams.                                                                                                                                                                      |
| <b>PO9</b>  | <b>Communication</b>                          | Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentations, make effective presentations considering cultural, language, and learning differences |
| <b>PO10</b> | <b>Project Management and Finance</b>         | 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.                                       |
| <b>PO11</b> | <b>Life-long learning</b>                     | 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)**

|            |                         |                                                                                                                                                                                                               |
|------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WK1</b> | <b>Natural Sciences</b> | A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences                                                                       |
| <b>WK2</b> | <b>Mathematics</b>      | 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. |

|            |                                     |                                                                                                                                                                                                                                                         |
|------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WK3</b> | <b>Engineering Fundamentals</b>     | A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline                                                                                                                                               |
| <b>WK4</b> | <b>Specialist Knowledge</b>         | 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.                                                |
| <b>WK5</b> | <b>Engineering Design/Ops</b>       | Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area                                     |
| <b>WK6</b> | <b>Engineering Practice</b>         | Knowledge of engineering practice (technology) in the practice areas in the engineering discipline                                                                                                                                                      |
| <b>WK7</b> | <b>Society &amp; Sustainability</b> | Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development                                    |
| <b>WK8</b> | <b>Research Literature</b>          | 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                                                                |
| <b>WK9</b> | <b>Ethics &amp; Conduct</b>         | 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 |

### **PROGRAM SPECIFIC OUTCOMES (PSO)**

|             |                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------|
| <b>PSO1</b> | Exhibit attitude for continuous learning and deliver efficient solutions for emerging challenges in IOT domain.  |
| <b>PSO2</b> | To gain critical understanding of hardware and software tools catering to the contemporary needs of IT industry. |

### **SUSTAINABLE DEVELOPMENT GOALS**

|              |                    |                                                                                                                                    |
|--------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>SDG01</b> | <b>No Poverty</b>  | End poverty in all its forms everywhere (eradicate extreme poverty currently measured as people living on less than \$1.25 a day.) |
| <b>SDG02</b> | <b>Zero Hunger</b> | End hunger, achieve food security and improved nutrition and promote sustainable agriculture                                       |

|              |                                                 |                                                                                                                      |
|--------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>SDG03</b> | <b>Good Health and Well-being</b>               | Ensure healthy lives and promote well-being for all at all ages                                                      |
| <b>SDG04</b> | <b>Quality Education</b>                        | Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all                 |
| <b>SDG05</b> | <b>Gender Equality</b>                          | Achieve gender equality and empower all women and girls                                                              |
| <b>SDG06</b> | <b>Clean Water and Sanitation</b>               | Ensure availability and sustainable management of water and sanitation for all                                       |
| <b>SDG07</b> | <b>Affordable and Clean Energy</b>              | Ensure access to affordable, reliable, sustainable and modern energy for all                                         |
| <b>SDG08</b> | <b>Decent Work and Economic Growth</b>          | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all |
| <b>SDG09</b> | <b>Industry, Innovation, and Infrastructure</b> | Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation            |
| <b>SDG10</b> | <b>Reduced Inequalities</b>                     | Reduce inequality within and among countries                                                                         |
| <b>SDG11</b> | <b>Sustainable Cities and Communities</b>       | Make cities inclusive, safe, resilient, and sustainable.                                                             |
| <b>SDG12</b> | <b>Responsible Consumption and Production</b>   | Ensure sustainable consumption and production patterns.                                                              |
| <b>SDG13</b> | <b>Climate Action</b>                           | Ensure sustainable consumption and production patterns.                                                              |
| <b>SDG14</b> | <b>Life Below Water</b>                         | Conserve and sustainably use marine resources.                                                                       |
| <b>SDG15</b> | <b>Life on Land</b>                             | Protect ecosystems, manage forests, combat desertification, and halt biodiversity loss.                              |
| <b>SDG16</b> | <b>Peace, Justice, and Strong Institutions</b>  | Promote peaceful societies, access to justice, and effective institutions.                                           |
| <b>SDG17</b> | <b>Partnerships for the Goals</b>               | Strengthen the global partnership for sustainable development.                                                       |

## DEFINITION OF CREDIT

| TEACHING ACTIVITY                                        | CREDIT EQUIVALENT |
|----------------------------------------------------------|-------------------|
| 1 Hour Lecture (L) per week per semester                 | 1 Credit          |
| 1 Hour Tutorial (T) per week per semester                | 1 Credit          |
| 2 Hours Practical / Laboratory (P) per week per semester | 1 Credit          |

## SCHEME OF CREDIT DISTRIBUTION-SUMMARY

|                                  | I    | II   | III  | IV   | V    | VI   | VII | VIII | Total |
|----------------------------------|------|------|------|------|------|------|-----|------|-------|
| Basic Science Courses            | 7    | 8.5  | 4    | -    | -    | -    | -   | -    | 19.5  |
| Engineering Science Courses      | 10.5 | 9    | -    | -    | -    | -    | -   | -    | 19.5  |
| Professional Core Courses        | -    | -    | 17.5 | 21.5 | 20.5 | 12   | 6   | -    | 77.5  |
| Professional Elective Courses    | -    | -    | -    | -    | -    | 3    | 3   | 3    | 9     |
| Humanities and Social Management | 3    | 3    | -    | 3    | -    | 1.5  | -   | -    | 10.5  |
| Open Elective Courses            | -    | -    | -    | -    | -    | 3    | 3   | 3    | 9     |
| Project / Internship / Hackathon | -    | -    | -    | -    | 1    | 2    | 5   | 6    | 14    |
| Mandatory Courses                | -    | -    | -    | -    | -    | -    | -   | -    | -     |
| Career Development Skill         | 1    | 1    | 1    | 1    | 1    | 1    | -   | -    | 6     |
| Skill Development Laboratory     | -    | -    | -    | 1    | 1    | 1    | 1   | -    | 4     |
| <b>TOTAL</b>                     | 21.5 | 21.5 | 22.5 | 23.5 | 23.5 | 23.5 | 18  | 12   | 166   |

## STRUCTURE OF THE UG PROGRAMME (Total: 166 Credits)

| Sl. No. | CODE | CATEGORY                            | SUGGESTED CREDITS (163) | CREDIT POINTS (166) |
|---------|------|-------------------------------------|-------------------------|---------------------|
| 1       | BSC  | Basic Science Courses               | 23*                     | 19.5                |
| 2       | ESC  | Engineering Science Courses         | 29*                     | 19.5                |
| 3       | PCC  | Professional Core Courses           | 59*                     | 77.5                |
| 4       | PEL  | Professional Elective Courses       | 12*                     | 9                   |
| 5       | HSM  | Humanities and Social Management    | 16*                     | 10.5                |
| 6       | OEL  | Open Elective Courses               | 09*                     | 9                   |
| 7       | PROJ | Project / Internship / Hackathon    | 15*                     | 14                  |
| 8       | SDL  | Skill Development Laboratory        | 04*                     | 4                   |
| 9       | MAN  | Mandatory Courses                   | Non Credit              | -                   |
| 10      | CDS  | Employability Enhancement Skill – I | 06                      | 6                   |
|         |      | Total Credits                       | 160-165                 | 166                 |

### **ABBREVIATION**

| <b>S.NO</b> | <b>ABBREVIATION</b> | <b>FULL FORM</b>                 |
|-------------|---------------------|----------------------------------|
| 1           | BSC                 | Basic Science Courses            |
| 2           | ESC                 | Engineering Science Courses      |
| 3           | HSM                 | Humanities and Social Management |
| 4           | CDS                 | Career Development Skill         |
| 5           | PCC                 | Professional Core Courses        |
| 6           | MAN                 | Mandatory Courses                |
| 7           | PROJ                | Project                          |
| 8           | PEC                 | Professional Elective Courses    |
| 9           | OEC                 | Open Elective Courses            |
| 10          | PET                 | Physical Education & Training    |
| 11          | AEC                 | Ability Enhancement Course       |
| 12          | SDL                 | Skill Development Learning       |
| 13          | MA                  | Mathematics                      |
| 14          | UH                  | Universal Human Values           |
| 15          | CS                  | Computer Science                 |
| 16          | IT                  | Information Technology           |
| 17          | BO                  | Biology                          |
| 18          | ME                  | Mechanical Engineering           |
| 19          | CD                  | Carrier Development              |
| 20          | PE                  | Physical Education               |
| 21          | EN                  | English                          |
| 22          | EE                  | Electrical & Electronics         |
| 23          | PC                  | Physics & Chemistry              |
| 24          | NS                  | National Social Service          |
| 25          | MN                  | Mandatory                        |
| 26          | NIH                 | NPTEL / Internship / Hackathon   |
| 27          | YOC                 | Yoga                             |

### **List of Program Offered**

| <b>S.No.</b>                       | <b>Programme</b>                                                                                             | <b>Programme Code</b> |
|------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>UNDER GRADUATE</b>              |                                                                                                              |                       |
| <b>B.Tech., Programmes Offered</b> |                                                                                                              |                       |
| 1                                  | B.Tech., - Artificial Intelligence and Data Science                                                          | AD                    |
| 2                                  | B.Tech., - Computer Science Engineering                                                                      | CS                    |
| 3                                  | B.Tech., - Electronics and Communication Engineering                                                         | EC                    |
| 4                                  | B.Tech., - Electrical and Electronics Engineering                                                            | EE                    |
| 5                                  | B.Tech., - Mechanical Engineering                                                                            | ME                    |
| 6                                  | B.Tech., - Information Technology                                                                            | IT                    |
| 7                                  | B.Tech., - Robotics and Automation                                                                           | RA                    |
| 8                                  | B.Tech., - Computer Science Engineering<br>( <i>IOT including Cyber Security and Blockchain Technology</i> ) | CB                    |
| <b>POSTGRADUATE</b>                |                                                                                                              |                       |
| <b>M.Tech., Programmes Offered</b> |                                                                                                              |                       |
| 1                                  | M.Tech., - Artificial Intelligence and Data Science                                                          | AS                    |
| <b>MBA</b>                         |                                                                                                              |                       |
| 1                                  | MBA - General                                                                                                | MA                    |

## SEMESTER-WISE COURSES AND CREDITS

### I SEMESTER

| Course Code  | Course Title                           | L         | T        | P         | Hrs/Wk    | SL        | C           | CIA | ESE | Total | Category |
|--------------|----------------------------------------|-----------|----------|-----------|-----------|-----------|-------------|-----|-----|-------|----------|
| MAC26101     | Matrices and Calculus                  | 3         | 1        | 0         | 4         | 2         | 4           | 40  | 60  | 100   | BSC      |
| UHC26102     | Universal Human Values-II              | 3         | 0        | 0         | 3         | -         | 3           | 40  | 60  | 100   | HSM      |
| CSC26103     | Problem Solving and Python Programming | 3         | 0        | 0         | 3         | 2         | 3           | 40  | 60  | 100   | ESC      |
| ITT26104     | IT Essential - Legacy                  | 3         | 0        | 0         | 3         | 1         | 3           | 40  | 60  | 100   | ESC      |
| BOT26105     | Biology for Computer Engineers         | 3         | 0        | 0         | 3         | 1         | 3           | 40  | 60  | 100   | BSC      |
| CSL26101     | Python Programming Lab                 | 0         | 0        | 3         | 3         | 1         | 1.5         | 60  | 40  | 100   | ESC      |
| MEL26102     | Engineering Workshop Laboratory        | 0         | 0        | 3         | 3         | 1         | 1.5         | 60  | 40  | 100   | ESC      |
| DTL26103     | Design Thinking and Idea Laboratory    | 0         | 0        | 3         | 3         | 1         | 1.5         | 60  | 40  | 100   | ESC      |
| CDC26101     | Career Development Skill – I           | 0         | 0        | 2         | 2         | 1         | 1           | 100 | -   | 100   | CDS      |
| PEC26101     | Physical Education and training        | 0         | 0        | 1         | 1         | -         | -           | 100 | -   | 100   | PET      |
| <b>TOTAL</b> |                                        | <b>15</b> | <b>1</b> | <b>12</b> | <b>28</b> | <b>10</b> | <b>21.5</b> |     |     |       |          |

### II SEMESTER

| Course Code  | Course Title                                            | L         | T        | P         | Hrs/Wk    | SL        | C           | CIA      | ESE      | Total    | Category |
|--------------|---------------------------------------------------------|-----------|----------|-----------|-----------|-----------|-------------|----------|----------|----------|----------|
| MAC26201     | Partial Differential Equations and Transforms           | 3         | 1        | 0         | 4         | 2         | 4           | 40       | 60       | 100      | BSC      |
| ENC26202     | Technical English and Communication                     | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | HSM      |
| EEC26203     | Basic Electrical and Electronics Engineering            | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | ESC      |
| PCT26204     | Physics and Chemistry for Computer Engineers            | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | BSC      |
| CST26205     | Programming in C                                        | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | ESC      |
| EEL26201     | Basic Electrical and Electronics Engineering Laboratory | 0         | 0        | 3         | 3         | 1         | 1.5         | 60       | 40       | 100      | ESC      |
| PCL26202     | Physics & Chemistry Laboratory                          | 0         | 0        | 3         | 3         | 1         | 1.5         | 60       | 40       | 100      | BSC      |
| MEL26203     | Engineering Graphics                                    | 0         | 0        | 3         | 3         | 1         | 1.5         | 100      | -        | 100      | ESC      |
| CDC26201     | Career Development Skill – II                           | 0         | 0        | 2         | 2         | 1         | 1           | 100      | -        | 100      | CDS      |
| NSC26201     | National Social Service / Village Camp / Rally          | 0         | 0        | 1         | 1         | -         | -           | 0        | 0        | 100      | NSS      |
| <b>TOTAL</b> |                                                         | <b>15</b> | <b>1</b> | <b>12</b> | <b>28</b> | <b>10</b> | <b>21.5</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

### III SEMESTER

| Course Code  | Course Title                                            | L         | T        | P         | Hrs/<br>Wk | SL        | C           | CIA      | ESE      | Total    | Category |
|--------------|---------------------------------------------------------|-----------|----------|-----------|------------|-----------|-------------|----------|----------|----------|----------|
| MAC26301     | Probability Statistics Linear Algebra                   | 3         | 1        | 0         | 4          | 2         | 4           | 40       | 60       | 100      | BSC      |
| CBT26302     | Data Structures and Algorithms                          | 3         | 0        | 0         | 3          | 1         | 4           | 40       | 60       | 100      | PCC      |
| CBT26303     | Embedded System Architecture and Interfacing            | 3         | 0        | 0         | 3          | 1         | 3           | 40       | 60       | 100      | PCC      |
| CBT26304     | Database Management Systems                             | 3         | 0        | 0         | 3          | 1         | 3           | 40       | 60       | 100      | PCC      |
| CBT26305     | Operating Systems                                       | 3         | 0        | 0         | 3          | 1         | 3           | 40       | 60       | 100      | PCC      |
| MNC26306     | Environmental Science                                   | 2         | 0        | 0         | 2          | -         | -           | 100      | -        | 100      | MAN      |
| CBL26301     | Embedded System Architecture and Interfacing Laboratory | 0         | 0        | 3         | 3          | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| CBL26302     | Database Management Systems Laboratory                  | 0         | 0        | 3         | 3          | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| CBL26303     | Data Structures and Algorithms Laboratory               | 0         | 0        | 3         | 3          | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| CDC26301     | Career Development Skill – III                          | 0         | 0        | 2         | 2          | 1         | 1           | 100      | -        | 100      | CDS      |
| PEC26301     | Physical Education                                      | 0         | 0        | 1         | 1          | -         | -           | 100      | -        | 100      | PET      |
| <b>TOTAL</b> |                                                         | <b>17</b> | <b>1</b> | <b>12</b> | <b>30</b>  | <b>10</b> | <b>22.5</b> | <b>-</b> | <b>-</b> | <b>-</b> |          |

### IV SEMESTER

| Course Code  | Course Title                                 | L         | T        | P         | Hrs /<br>Wk | SL        | C           | CIA      | ESE      | Total    | Category |
|--------------|----------------------------------------------|-----------|----------|-----------|-------------|-----------|-------------|----------|----------|----------|----------|
| CBT26401     | Design and Analysis of Algorithm             | 3         | 0        | 0         | 3           | 1         | 4           | 40       | 60       | 100      | PCC      |
| CBT26402     | Automata and Compiler Design                 | 3         | 0        | 0         | 3           | 1         | 4           | 40       | 60       | 40       | PCC      |
| CBT26403     | Internet of Things                           | 3         | 0        | 0         | 3           | 1         | 3           | 40       | 60       | 40       | PCC      |
| CBT26404     | Number Theory and Cryptography               | 3         | 0        | 0         | 3           | 1         | 3           | 40       | 60       | 40       | PCC      |
| CBT26405     | Computer Networks                            | 3         | 0        | 0         | 3           | 1         | 3           | 40       | 60       | 40       | PCC      |
| MNC26406     | Indian Constitution                          | 2         | 0        | 0         | 2           | -         | -           | 100      | -        | 100      | MAN      |
| CBP26401     | Design and Analysis of Algorithms Laboratory | 0         | 0        | 3         | 3           | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| CBL26402     | Internet of Things Laboratory                | 0         | 0        | 3         | 3           | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| CBL26403     | Computer Networks Laboratory                 | 0         | 0        | 3         | 3           | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| NIH26001     | NPTEL/Internship/Hackathon                   | 1         | 0        | 0         | 1           | 1         | 1           | 100      | -        | 100      | SDL      |
| CDC26401     | Career Development Skill – IV                | 0         | 0        | 2         | 2           | 1         | 1           | 100      | -        | 100      | CDS      |
| YOC26401     | Yoga                                         | 0         | 0        | 1         | 1           | -         | -           | 100      | -        | 100      | AEC      |
| <b>TOTAL</b> |                                              | <b>18</b> | <b>0</b> | <b>12</b> | <b>30</b>   | <b>10</b> | <b>23.5</b> | <b>-</b> | <b>-</b> | <b>-</b> |          |

### V SEMESTER

| Course Code  | Course Title                 | L  | T | P  | Hrs/Wk | SL | C    | CIA | ESE | Total | Category |
|--------------|------------------------------|----|---|----|--------|----|------|-----|-----|-------|----------|
| CBT26501     | AIoT and IIoT                | 3  | 1 | 0  | 4      | 1  | 4    | 40  | 60  | 100   | PCC      |
| CBT26502     | Full Stack Development       | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PCC      |
| CBT26503     | Machine Learning             | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PCC      |
| CBT26504     | Blockchain Technology        | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PCC      |
| CBT26505     | Organizational Behavior      | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PCC      |
| CBL26501     | Advanced IoT Laboratory      | 0  | 0 | 3  | 3      | 1  | 1.5  | 60  | 40  | 100   | PCC      |
| CBL26502     | Full Stack Development Lab   | 0  | 0 | 3  | 3      | 1  | 1.5  | 60  | 40  | 100   | PCC      |
| CBL26503     | Machine Learning Lab         | 0  | 0 | 3  | 3      | 1  | 1.5  | 60  | 40  | 100   | PCC      |
| CBP26501     | Micro Project                | 0  | 0 | 2  | 2      | 1  | 1    | 100 | -   | 100   | PROJ     |
| NIH26001     | NPTEL/Internship/Hackathon   | 1  | 0 | 0  | 1      | 1  | 1    | 100 | -   | 100   | SDL      |
| CDC26501     | Career Development Skill – V | 0  | 0 | 2  | 2      | 1  | 1    | 100 | -   | 100   | CDS      |
| <b>TOTAL</b> |                              | 16 | 1 | 10 | 27     | 10 | 23.5 | -   | -   | -     |          |

### VI SEMESTER

| Course Code  | Course Title                                | L  | T | P  | Hrs/Wk | SL | C    | CIA | ESE | Total | Category |
|--------------|---------------------------------------------|----|---|----|--------|----|------|-----|-----|-------|----------|
| CBT26601     | Smart Contracts and Application Development | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PCC      |
| CBT26602     | Ethical Hacking                             | 3  | 1 | 0  | 4      | 2  | 3    | 40  | 60  | 40    | PCC      |
| CBT26603     | Wireless Communication                      | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PCC      |
| CBPE26XX     | Professional Elective – I                   | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | PEL      |
| CBOE26XX     | Open Elective – I                           | 3  | 0 | 0  | 3      | 1  | 3    | 40  | 60  | 100   | OEL      |
| CBL26601     | Blockchain and Smart Contracts Lab          | 0  | 0 | 3  | 3      | 1  | 1.5  | 60  | 40  | 100   | PCC      |
| CBL26602     | Cyber Security Laboratory                   | 0  | 0 | 3  | 3      | 1  | 1.5  | 60  | 40  | 100   | PCC      |
| ENP26601     | Communication Skills Laboratory             | 0  | 0 | 3  | 3      | 1  | 1.5  | 60  | 40  | 100   | HSM      |
| CBP26601     | Mini Project                                | 0  | 0 | 4  | 4      | 3  | 2    | 50  | 50  | 100   | PROJ     |
| NIH26001     | NPTEL/Internship/Hackathon                  | 1  | 0 | 0  | 1      | 1  | 1    | 100 | -   | 100   | SDL      |
| CDC26601     | Career Development Skill – VI               | 0  | 0 | 2  | 2      | -  | 1    | 100 | -   | 100   | CDS      |
| <b>TOTAL</b> |                                             | 15 | 1 | 12 | 28     | 12 | 23.5 | -   | -   | -     |          |

ACET B.Tech Computer Science & Engineering (IOT including Cyber Security and Blockchain Technology)2026-2027 Regulation

## VII SEMESTER

| Course Code  | Course Title                             | L         | T        | P         | Hrs/Wk    | SL        | C         | CIA      | SEE      | Total    | Category |
|--------------|------------------------------------------|-----------|----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| CBT26701     | Cloud Computing                          | 3         | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | PCC      |
| CBT26702     | Creative Innovation and Entrepreneurship | 3         | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | PCC      |
| CBPE26XX     | Professional Elective – II               | 3         | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | PEL      |
| CBOE26XX     | Open Elective – II                       | 3         | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | OEL      |
| CBP26701     | Project Work – Phase I                   | 0         | 0        | 10        | 10        | 6         | 5         | 50       | 50       | 100      | PROJ     |
| NIH27001     | NPTEL/ Internship / Hackathon            | 1         | 0        | 0         | 1         | 1         | 1         | 100      | -        | 100      | SDL      |
| <b>TOTAL</b> |                                          | <b>13</b> | <b>0</b> | <b>10</b> | <b>23</b> | <b>11</b> | <b>18</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

## VIII SEMESTER

| Course Code  | Course Title                | L        | T        | P         | Hrs/Wk    | SL        | C         | CIA      | SEE      | Total    | Category |
|--------------|-----------------------------|----------|----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| CBPE26XX     | Professional Elective – III | 3        | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | PEL      |
| CBOE26XX     | Open Elective – III         | 3        | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | OEL      |
| CBP26701     | Project Work – Phase II     | 0        | 0        | 12        | 12        | 8         | 6         | 50       | 50       | 100      | PROJ     |
| <b>TOTAL</b> |                             | <b>6</b> | <b>0</b> | <b>12</b> | <b>18</b> | <b>10</b> | <b>12</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

# SEMESTER - I

|          |                                     |                 |          |          |          |               |
|----------|-------------------------------------|-----------------|----------|----------|----------|---------------|
| MAC26101 | <i><b>MATRICES AND CALCULUS</b></i> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|          |                                     | BSC             | 3        | 1        | 0        | 4             |

#### Course Prerequisite / Preamble

- Basic knowledge of algebra, trigonometry, and calculus.
- Understanding of matrices and elementary differential equations.
- Foundation for advanced engineering mathematics and applications.

#### Course Objective

- To introduce the concepts of Eigen values, Eigen vectors, matrix transformations, and quadratic forms.
- To develop problem-solving skills in multivariable differential calculus and optimization techniques.
- To provide knowledge of double and triple integrals and their applications in area and volume calculations.
- To familiarize students with vector calculus operations and integral theorems used in engineering applications.
- To enable students to solve higher order and simultaneous differential equations arising in scientific and engineering problems.

#### Course Outcome

|     |                                                                                                                                           |    |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------|----|
| CO1 | Apply matrix algebra concepts including Eigen values, Eigen vectors, diagonalization, and quadratic forms to solve mathematical problems. | K3 |
| CO2 | Use multivariable differential calculus techniques to analyze functions of several variables and optimization problems.                   | K3 |
| CO3 | Evaluate double and triple integrals for computing area, volume, and coordinate transformations.                                          | K3 |
| CO4 | Apply vector calculus operations and integral theorems to analyze vector fields and physical problems.                                    | K3 |
| CO5 | Solve higher order and simultaneous differential equations using appropriate analytical methods.                                          | K3 |

| Syllabus                                                                                                                                                                                                                                                                                 |                                            |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------|
| <b>Unit 1</b>                                                                                                                                                                                                                                                                            | <b>Eigen Values and Quadratic Forms</b>    | <b>(12)</b> |
| Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Cayley-Hamilton theorem (excluding proof) – Diagonalization of matrices – Reduction of Quadratic form to canonical form by using orthogonal transformation – Nature of a Quadratic form                   |                                            |             |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                            | <b>Multivariable Differential Calculus</b> | <b>(12)</b> |
| Partial derivatives (excluding Euler's theorem) – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers. |                                            |             |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                            | <b>Multiple Integrals</b>                  | <b>(12)</b> |
| Double integrals – Change of order of integration – Double integrals in polar co-ordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals                                                                    |                                            |             |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                            | <b>Vector Calculus</b>                     | <b>(12)</b> |
| Vector Differential Operator – Gradient – Properties – Directional derivative – Divergence and Curl properties and relations – Solenoidal and Irrotational vector fields – Green's theorem – Stoke's theorem – Gauss divergence theorem.                                                 |                                            |             |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                            | <b>Differential Equations</b>              | <b>(12)</b> |
| Higher order linear differential equations with constant coefficients – Method of undetermined coefficients – Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.  |                                            |             |

**Total Hours: 60**

|                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ol style="list-style-type: none"> <li>1. B. S. Grewal, <i>Higher Engineering Mathematics</i>, Khanna Publishers.</li> <li>2. S. S. Sastry, <i>Engineering Mathematics Volume I</i>, Prentice Hall of India.</li> <li>3. N. P. Bali and Manish Goyal, <i>Engineering Mathematics</i>, Laxmi Publications.</li> <li>4. Erwin Kreyszig, <i>Advanced Engineering Mathematics</i>, Wiley India, 11<sup>th</sup> Edition, 2025</li> </ol> |
| <b>Reference:</b>                                                                                                                                                                                                                                                                                                                                                                                                                    |

1. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publishing House.
2. B. V. Ramana, *Higher Engineering Mathematics*, McGraw Hill Education.
3. H. K. Dass, *Engineering Mathematics*, S. Chand Publications.
4. A. Singaravelu, *Engineering Mathematics*, Meenakshi Agency.

**Web / NPTEL Resources:**

1. <https://nptel.ac.in/courses/111105160>
2. [https://onlinecourses.nptel.ac.in/e-learning/preview/noc21\\_ma58](https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ma58)
3. <https://www.coursera.org/specializations/mathematics-engineers>

**CO-PO Mapping**

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

| Assessment Methodology |                     |       |
|------------------------|---------------------|-------|
| Assessment Methodology | Assessment Tools    | Marks |
| Internal Test I        | Written Examination | 10    |
| Internal Test II       | Written Examination | 10    |
| Internal Test III      | Written Examination | 10    |
| Assessment             | Assignment          | 05    |
| Attendance             | Performance         | 05    |
| Total                  |                     | 40    |

|                 |                                  |                 |          |          |          |               |
|-----------------|----------------------------------|-----------------|----------|----------|----------|---------------|
| <b>UHC26102</b> | <b>UNIVERSAL HUMAN VALUES-II</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                  | <b>HSM</b>      | <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b>      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                    |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------|
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                    |           |
| <ul style="list-style-type: none"> <li>To understand the significance of human values and ethical behavior.</li> <li>To develop self-awareness and harmony in individual and social life.</li> <li>To inculcate professional ethics and social responsibility among students.</li> <li>To create awareness about sustainable living and environmental harmony.</li> <li>To promote holistic development for responsible citizenship and professional practice</li> </ul> |                                                                                    |           |
| <b>Course Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                    |           |
| <b>CO1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Understand the importance of human values and ethical principles.                  | <b>K2</b> |
| <b>CO2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Apply self-exploration methods for personal development and harmony.               | <b>K3</b> |
| <b>CO3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Analyze the role of relationships, family, and society in human life.              | <b>K4</b> |
| <b>CO4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Interpret professional ethics and social responsibilities in engineering practice. | <b>K4</b> |
| <b>CO5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Evaluate sustainable living practices for harmony with nature and society.         | <b>K5</b> |

|                                                                                                                                                                                                                                                                                 |                                             |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------|
| <b>Syllabus</b>                                                                                                                                                                                                                                                                 |                                             |            |
| <b>Unit 1</b>                                                                                                                                                                                                                                                                   | <b>INTRODUCTION TO HUMAN VALUES</b>         | <b>(9)</b> |
| Need, basic guidelines, and content of value education – Self-exploration – Happiness and prosperity – Harmony in the human being – Understanding human aspirations – Continuous happiness and sustainable living – Right understanding, relationship, and physical facilities. |                                             |            |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                   | <b>HARMONY IN THE FAMILY AND SOCIETY</b>    | <b>(9)</b> |
| Family as the basic unit of human interaction – Values in relationships – Trust and respect – Understanding harmony in family – Justice in relationships – Human relationships and society – Role of education and culture in social harmony.                                   |                                             |            |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                   | <b>PROFESSIONAL ETHICS AND HUMAN VALUES</b> | <b>(9)</b> |
| Professional ethics – Engineering ethics – Ethical responsibilities of engineers – Integrity and accountability – Respect for human rights – Leadership qualities – Workplace ethics – Case studies on ethical dilemmas in professional life.                                   |                                             |            |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                   | <b>ENVIRONMENT AND SUSTAINABILITY</b>       | <b>(9)</b> |
| Harmony with nature – Ecological balance – Environmental pollution and control – Sustainable development – Conservation of natural resources – Climate change and environmental ethics – Individual responsibility towards environment protection.                              |                                             |            |

|                                                                                                                                                                                                                                                  |                                   |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------|
| <b>Unit 5</b>                                                                                                                                                                                                                                    | <b>HOLISTIC HUMAN DEVELOPMENT</b> | <b>9 hours</b> |
| Holistic perception of harmony – Health and happiness – Social responsibility – Universal human order – Peace and coexistence – Humanistic education – Role of technology in societal development – Vision for a humane and sustainable society. |                                   |                |

**Total Hours: 45**

|                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                               |
| <ol style="list-style-type: none"> <li>1. R.R. Gaur, R. Sangal and G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books.</li> <li>2. A.N. Tripathi, Human Values, New Age International Publishers.</li> </ol> |

|                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reference:</b>                                                                                                                                                                                                 |
| <ol style="list-style-type: none"> <li>1. M. Govindarajan, Professional Ethics and Human Values, PHI Learning.</li> <li>2. B.S. Nagarajan, Human Values and Professional Ethics, Scitech Publications.</li> </ol> |

|                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                      |
| <ol style="list-style-type: none"> <li>1. <a href="https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ee67">https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ee67</a></li> </ol> |

| <b>CO-PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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                  | 2          | 2          | -          | -          | -          | 2          | 2          | 3          | 1          | 1           | -           | 1           | 1           |
| CO2                  | 2          | 2          | 1          | -          | -          | 2          | 2          | 3          | 2          | 1           | -           | 1           | 1           |
| CO3                  | 2          | 3          | 1          | 1          | -          | 3          | 2          | 3          | 2          | 2           | -           | 1           | 1           |
| CO4                  | 2          | 3          | 2          | 1          | 1          | 3          | 2          | 3          | 2          | 2           | 1           | 1           | 1           |
| CO5                  | 2          | 2          | 1          | 2          | 1          | 3          | 3          | 3          | 2          | 2           | 1           | 1           | 2           |

| <b>Assessment Methodology</b> |                         |              |
|-------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b> | <b>Marks</b> |
| Internal Test I               | Written Examination     | 10           |
| Internal Test II              | Written Examination     | 10           |
| Internal Test III             | Written Examination     | 10           |
| Assessment                    | Assignment              | 05           |
| Attendance                    | Performance             | 05           |
| Total                         |                         | 40           |

| CSC26103 | PROBLEM SOLVING<br>AND PYTHON<br>PROGRAMMING | CATEGORY | L | T | P | CREDIT |
|----------|----------------------------------------------|----------|---|---|---|--------|
|          |                                              | ESC      | 3 | 0 | 0 | 3      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| <ul style="list-style-type: none"> <li>Basic understanding of computers, logical reasoning, and programming fundamentals.</li> <li>This course provides the foundation for developing problem-solving skills and programming applications using Python.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <ul style="list-style-type: none"> <li>Understand the fundamentals of Python programming, including syntax, data types, operators, and input/output operations.</li> <li>Develop problem-solving skills using decision-making constructs, looping statements, and control structures in Python.</li> <li>Design and implement reusable programs using functions, modules, packages, and standard Python libraries.</li> <li>Apply Python data structures and file handling techniques to store, process, and manage data effectively.</li> <li>Develop object-oriented Python applications using classes, objects, inheritance, polymorphism, encapsulation, and other OOP concepts.</li> </ul> |  |
| <b>Course Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| <ul style="list-style-type: none"> <li>To understand the fundamentals of Python programming language.</li> <li>To apply decision-making and looping concepts in problem solving.</li> <li>To develop modular programming skills using functions and modules.</li> <li>To learn Python data structures and file handling techniques.</li> <li>To implement object-oriented programming concepts using Python.</li> </ul>                                                                                                                                                                                                                                                                         |  |

| Syllabus                                                                                                                                                                                                       |                                    |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------|
| <b>Unit 1</b>                                                                                                                                                                                                  | <b>Introduction To Python</b>      | <b>(9)</b> |
| Introduction to Python – Features of Python – Installation and execution – Variables and data types – Input and output statements – Operators and expressions – Type conversion – Python programming examples. |                                    |            |
| <b>Unit 2</b>                                                                                                                                                                                                  | <b>Decision Making and Looping</b> | <b>(9)</b> |
| Conditional statements – if, if-else, nested if – Looping statements – for loop, while loop – break, continue, pass statements – Pattern generation – Problem solving using loops.                             |                                    |            |
| <b>Unit 3</b>                                                                                                                                                                                                  | <b>Functions And Modules</b>       | <b>(9)</b> |

|                                                                                                                                                                   |                                              |            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------|
| Functions – Function arguments – Return values – Lambda functions – Recursive functions – Modules and packages – Import statements – Python standard libraries.   |                                              |            |
| <b>Unit 4</b>                                                                                                                                                     | <b>Data Structures and File Handling</b>     | <b>(9)</b> |
| Strings – Lists – Tuples – Dictionaries – Sets – File operations – Reading and writing files – Exception handling – Applications using data structures and files. |                                              |            |
| <b>Unit 5</b>                                                                                                                                                     | <b>Object Oriented Programming in Python</b> | <b>(9)</b> |
| Classes and objects – Constructors – Inheritance – Polymorphism – Encapsulation – Method overloading and overriding – Simple applications using Python.           |                                              |            |

**Total Hours: 45**

|                                                                                                                                                                                                                                                                                                                                    |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                  |  |  |
| <ol style="list-style-type: none"> <li>1. Reema Thareja, Python Programming using Problem Solving Approach, Oxford University Press.</li> <li>2. Y. Daniel Liang, Introduction to Programming using Python, Pearson Education.</li> <li>3. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Publications.</li> </ol> |  |  |
| <b>Reference</b>                                                                                                                                                                                                                                                                                                                   |  |  |
| <ol style="list-style-type: none"> <li>1. Mark Lutz, Learning Python, O'Reilly Publications.</li> <li>2. Allen B. Downey, Think Python, Green Tea Press.</li> <li>3. Kenneth A. Lambert, Fundamentals of Python, Cengage Learning.</li> </ol>                                                                                      |  |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
| <ol style="list-style-type: none"> <li>1. <a href="https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs109">https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs109</a></li> <li>2. <a href="https://nptel.ac.in/courses/106106182">https://nptel.ac.in/courses/106106182</a></li> <li>3. <a href="https://nptel.ac.in/courses/115104095">https://nptel.ac.in/courses/115104095</a></li> </ol> |  |  |

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

| <b>Assessment Methodology</b> |                         |              |
|-------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b> | <b>Marks</b> |
| Internal Test I               | Written Examination     | 10           |
| -Internal Test II             | Written Examination     | 10           |
| Internal Test III             | Written Examination     | 10           |
| Assessment                    | Assignment              | 05           |
| Attendance                    | Performance             | 05           |
| Total                         |                         | 40           |

|          |                              |                 |          |          |          |               |
|----------|------------------------------|-----------------|----------|----------|----------|---------------|
| ITT26104 | <b>IT ESSENTIALS- LEGACY</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|          |                              | ESC             | 3        | 0        | 0        | 3             |

### Course Prerequisite / Preamble

- Basic mathematics and logical reasoning.
- This course aims to build foundational literacy in computer hardware, software, networking and mobile communication concepts.
- It develops awareness of information security practices and introduces emerging IT technologies shaping the digital world.

### Course Objective

- To understand the fundamentals of computer organization, architecture and number systems.
- To introduce the basics of computer networks, the Internet and the World Wide Web.
- To explain the working principles and architecture of mobile/cellular communication systems.
- To create awareness of information security concepts, threats and protective practices.
- To familiarize learners with emerging IT technologies and their responsible use.

### Course Outcome

|            |                                                                                                                        |    |
|------------|------------------------------------------------------------------------------------------------------------------------|----|
| <b>CO1</b> | Explain the types, applications and organization of computers, including CPU, memory, storage and number systems.      | K2 |
| <b>CO2</b> | Describe computer networks, network devices, the OSI/TCP-IP models, IP addressing and Internet fundamentals.           | K2 |
| <b>CO3</b> | Summarize the working principles, architecture and generations of mobile/cellular communication systems.               | K2 |
| <b>CO4</b> | Apply information security fundamentals such as the CIA triad, authentication, encryption and safe browsing practices. | K3 |
| <b>CO5</b> | Outline emerging IT technologies including cloud computing, IoT, AI/Generative AI, big data and blockchain.            | K2 |

### Syllabus

|               |                                                                                                                                                                                                                                                                                           |   |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <b>Unit 1</b> | <b>Computer Fundamentals</b>                                                                                                                                                                                                                                                              | 9 |
|               | Types of Computers -Applications of Computers - Computer Organization and Architecture: basics -CPU, ALU, Control Unit, Registers - Memory: RAM, ROM, Cache - Secondary Storage - Input and Output Devices - Number Systems: Binary, Decimal, Octal and Hexadecimal -Data Representation. |   |
| <b>Unit 2</b> | <b>Networking &amp; Internet</b>                                                                                                                                                                                                                                                          | 9 |
|               | Computer networks - LAN/MAN/WAN - network devices - topologies - OSI and TCP/IP models - IP addressing - DNS, DHCP - routers and switches - Internet and WWW - browsers - email - basic troubleshooting.                                                                                  |   |
| <b>Unit 3</b> | <b>Mobile Communication Essentials</b>                                                                                                                                                                                                                                                    | 9 |

|               |                                                                                                                                                                                                                                           |   |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|               | Cell phone working fundamentals - cell phone frequencies and channels - digital cell phone components - generations of cellular networks - cell phone network technologies/architecture - voice calls and SMS.                            |   |
| <b>Unit 4</b> | <b>Information Security</b>                                                                                                                                                                                                               | 9 |
|               | Fundamentals of information security - CIA triad - authentication and authorization - passwords and MFA - malware, phishing, social engineering - firewalls, antivirus - encryption basics - safe browsing - data privacy - cyber ethics. |   |
| <b>Unit 5</b> | <b>Emerging IT Technologies</b>                                                                                                                                                                                                           | 9 |
|               | Cloud computing - virtualization - IoT - Artificial Intelligence and Generative AI - Big Data - blockchain basics - mobile computing - edge computing - digital transformation - responsible use of AI.                                   |   |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ol style="list-style-type: none"> <li>1. Rajaraman, V., Introduction to Information Technology, 3rd Edition, PHI Learning, 2018.</li> <li>2. Forouzan, B.A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.</li> </ol>                                                                                                                                                                                                                                                                                                           |
| <b>Reference</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ol style="list-style-type: none"> <li>1. Sinha, P.K. and Sinha, P., Computer Fundamentals, 6th Edition, BPB Publications, 2016.</li> <li>2. Tanenbaum, A.S. and Wetherall, D., Computer Networks, 5th Edition, Pearson, 2011.</li> <li>3. Schiller, J., Mobile Communications, 2nd Edition, Pearson, 2009.</li> <li>4. Stallings, W., Computer Security: Principles and Practice, 4th Edition, Pearson, 2018.</li> <li>5. Rittinghouse, J.W. and Ransome, J.F., Cloud Computing: Implementation, Management and Security, CRC Press, 2017.</li> </ol> |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ol style="list-style-type: none"> <li>1. NPTEL -- IIT Madras: Problem Solving through Programming / IT Fundamentals.</li> <li>2. SWAYAM -- Computer Networks (IIT Kharagpur).</li> <li>3. NPTEL -- Cyber Security and Privacy.</li> </ol>                                                                                                                                                                                                                                                                                                             |

| CO-PO Mapping |     |     |     |     |     |     |     |     |     |          |          |          |          |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|
| COs           | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1<br>0 | PO1<br>1 | PSO<br>1 | PSO<br>2 |
| CO1           | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        | -        |
| CO2           | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -        | -        | -        | -        |
| CO3           | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        | -        |
| CO4           | 3   | 2   | 2   | -   | 2   | -   | -   | -   | -   | -        | -        | -        | -        |
| CO5           | 3   | 2   | 2   | -   | 2   | -   | -   | -   | -   | -        | -        | -        | -        |

| <b>Assessment Methodology</b>  |                         |              |
|--------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b>  | <b>Assessment Tools</b> | <b>Marks</b> |
| Continuous Internal Assessment | Assignment / Tutorial   | 10           |
| Internal Test I                | Written Examination     | 05           |
| Internal Test II               | Written Examination     | 05           |
| Model Examination              | Written Examination     | 10           |
| Attendance                     | Performance             | 10           |
| Total                          |                         | 40           |

| BOT26105 | <i><b>BIOLOGY FOR COMPUTER ENGINEERS</b></i> | CATEGORY | L | T | P | CREDIT |
|----------|----------------------------------------------|----------|---|---|---|--------|
|          |                                              | BSC      | 3 | 0 | 0 | 3      |

| Course Prerequisite / Preamble                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                               |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------|
| <ul style="list-style-type: none"> <li>Basic understanding of Biology concepts studied at Higher Secondary level.</li> <li>This course provides the foundation for understanding biological systems and their engineering applications in biotechnology, healthcare, environment, and sustainable technologies.</li> </ul>                                                                                                                                                                              |                                                                               |           |
| Course Objective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |           |
| <ul style="list-style-type: none"> <li>To introduce the fundamental concepts of biology relevant to engineering applications.</li> <li>To understand the structure and functions of cells and biomolecules.</li> <li>To familiarize students with genetics, biotechnology, and bioengineering concepts.</li> <li>To provide knowledge on biological processes and their industrial applications.</li> <li>To create awareness about environmental sustainability and biomedical innovations.</li> </ul> |                                                                               |           |
| Course Outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                               |           |
| <b>CO1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Understand the structure and functions of cells and biomolecules.             | <b>K2</b> |
| <b>CO2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Explain biological processes and metabolic pathways relevant to engineering.  | <b>K2</b> |
| <b>CO3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Apply genetics and biotechnology concepts in engineering applications.        | <b>K3</b> |
| <b>CO4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Analyse environmental and biomedical applications of biology.                 | <b>K4</b> |
| <b>CO5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Interpret the role of biological systems in sustainable engineering solutions | <b>K5</b> |

| Syllabus                                                                                                                                                                                                                                                             |                                   |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                        | <b>Cell Biology</b>               | <b>(9)</b> |
| Introduction to Biology – Cell as basic unit of life – Prokaryotic and eukaryotic cells – Cell structure and functions – Cell membrane – Nucleus – Mitochondria – Chloroplast – Cell division – Mitosis and meiosis – Applications in engineering and biotechnology. |                                   |            |
| <b>Unit II</b>                                                                                                                                                                                                                                                       | <b>Biomolecules and Enzymes</b>   | <b>(9)</b> |
| Structure and functions of carbohydrates, proteins, lipids, and nucleic acids – DNA and RNA – Enzymes – Classification and mechanism of enzyme action – Factors affecting enzyme activity – Industrial and biomedical applications of enzymes.                       |                                   |            |
| <b>Unit III</b>                                                                                                                                                                                                                                                      | <b>Genetics and Biotechnology</b> | <b>(9)</b> |

|                                                                                                                                                                                                                                              |                                                   |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------|
| Principles of genetics – Mendel's laws – Chromosomes and genes – Genetic engineering – Recombinant DNA technology – Polymerase Chain Reaction (PCR) – Cloning – Applications of biotechnology in medicine, agriculture, and industry.        |                                                   |            |
| <b>Unit IV</b>                                                                                                                                                                                                                               | <b>Microbiology and Environmental Biology</b>     | <b>(9)</b> |
| Introduction to microorganisms – Bacteria, fungi, and viruses – Microbial growth – Industrial microbiology – Waste management – Bioremediation – Environmental pollution and control – Sustainable environmental practices.                  |                                                   |            |
| <b>Unit V</b>                                                                                                                                                                                                                                | <b>Bioengineering and Biomedical Applications</b> | <b>(9)</b> |
| Introduction to bioengineering – Tissue engineering – Biosensors – Biomedical devices – Artificial organs – Bioinformatics – Applications of biology in healthcare engineering – Ethical issues in biotechnology and biomedical engineering. |                                                   |            |

**Total Hours: 45**

|                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                     |
| <ol style="list-style-type: none"> <li>1. T. Johnson, Biology for Engineers, CRC Press.</li> <li>2. Arthur T. Johnson, Biology for Engineers, Academic Press.</li> <li>3. Campbell and Reece, Biology, Pearson Education.</li> <li>4. U. Satyanarayana, Biotechnology, Books and Allied Publications.</li> </ol>                      |
| <b>Reference</b>                                                                                                                                                                                                                                                                                                                      |
| <ol style="list-style-type: none"> <li>1. Lehninger, Principles of Biochemistry, W.H. Freeman Publications.</li> <li>2. Prescott, Microbiology, McGraw Hill Education.</li> <li>3. B.D. Singh, Biotechnology, Kalyani Publishers.</li> <li>4. Gerard J. Tortora, Principles of Anatomy and Physiology, Wiley Publications.</li> </ol> |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                                          |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/121106008">https://nptel.ac.in/courses/121106008</a></li> <li>2. <a href="https://nptel.ac.in/courses/102106081">https://nptel.ac.in/courses/102106081</a></li> </ol>                                                                                  |

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

| <b>Assessment Methodology</b> |                         |              |
|-------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b> | <b>Marks</b> |
| Internal Test I               | Written Examination     | 10           |
| Internal Test II              | Written Examination     | 10           |
| Internal Test III             | Written Examination     | 10           |
| Assessment                    | Assignment              | 05           |
| Attendance                    | Performance             | 05           |
| Total                         |                         | 40           |

|          |                           |          |   |   |   |        |
|----------|---------------------------|----------|---|---|---|--------|
| CSL26101 | PYTHON PROGRAMMING<br>LAB | CATEGORY | L | T | P | CREDIT |
|          |                           | ESC      | 0 | 0 | 3 | 1.5    |

#### Course Prerequisite / Preamble

- Basic programming language concepts and logic building.
- This laboratory course introduces students to problem solving using Python programming language.
- The course emphasizes hands-on programming skills through real-life, scientific, and technical applications.
- Students gain knowledge in Python syntax, control structures, functions, file handling, exception handling, modules, libraries, and game development using Pygame.
- The course enables students to develop logical thinking, computational skills, and programming proficiency for engineering applications.

#### Course Objective

- To develop applications using Python programming concepts and standard libraries.
- To develop problem-solving ability using conditional statements and iterative loops.
- To implement functions, strings, modules, and file handling techniques in Python.
- To demonstrate exception handling and real-time programming applications.
- To explore Pygame tool for developing interactive gaming applications.

#### Course Outcome

|     |                                                                                         |    |
|-----|-----------------------------------------------------------------------------------------|----|
| CO1 | Develop applications for simple real-life problems using Python.                        | K3 |
| CO2 | Write programs using Python statements, expressions, conditionals, and iterative loops. | K3 |
| CO3 | Write programs by implementing functions, strings, and Python standard libraries.       | K3 |
| CO4 | Demonstrate applications by dealing with exceptions and file handling.                  | K4 |
| CO5 | Explore Pygame tool by developing an interactive gaming application.                    | K5 |

| Exp. No. | Title                                       | Description / Problem Statements                                                                                                                             | CO  |
|----------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Ex.1     | Real-Life / Scientific / Technical Problems | Identification and solving of simple real-life or scientific or technical problems – Electricity Billing, Retail Shop Billing, Sin Series, etc.              | CO1 |
| Ex.2     | Simple Statements and Expressions           | Python programming using simple statements and expressions – exchange values of two variables, circulate values of n variables, distance between two points. | CO2 |

|       |                                       |                                                                                                                                                                                      |     |
|-------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Ex.3  | Conditionals and Iterative Loops      | Scientific problems using conditionals and iterative loops – Number Series, Number Patterns, Pyramid Pattern.                                                                        | CO2 |
| Ex.4  | Lists and Tuples                      | Implementing real-time / technical applications using Lists and Tuples.                                                                                                              | CO2 |
| Ex.5  | Sets and Dictionaries                 | Implementing real-time / technical applications using Sets and Dictionaries – language components, automobile elements, civil structure elements; operations of Sets & Dictionaries. | CO2 |
| Ex.6  | Functions                             | Implementing programs using Functions – Factorial, largest number in a list, area of shapes.                                                                                         | CO3 |
| Ex.7  | Strings                               | Implementing programs using Strings – reverse, palindrome check, character count, replacing characters.                                                                              | CO3 |
| Ex.8  | Modules and Python Standard Libraries | Implementing programs using written modules and Python Standard Libraries – Pandas, NumPy, Matplotlib, SciPy.                                                                        | CO3 |
| Ex.9  | File Handling                         | Implementing real-time / technical applications using File Handling – copy from one file to another, word count, longest word.                                                       | CO4 |
| Ex.10 | Exception Handling                    | Implementing real-time / technical applications using Exception Handling – divide by zero error, voter's age validity, student mark range validation.                                | CO4 |
| Ex.11 | Pygame – Gaming Application           | Exploring Pygame tool; developing a game activity using Pygame – bouncing ball, car race, etc.                                                                                       | CO5 |

**Total Hours : 45**

|                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                    |
| <ol style="list-style-type: none"> <li>1. Allen B. Downey, <i>Think Python: How to Think Like a Computer Scientist</i>, 2nd Edition, O'Reilly Media, 2015.</li> <li>2. Mark Lutz, <i>Learning Python</i>, 5th Edition, O'Reilly Media, 2013.</li> <li>3. Wesley J. Chun, <i>Core Python Applications Programming</i>, 3rd Edition, Prentice Hall, 2012.</li> </ol>                   |
| <b>Reference</b>                                                                                                                                                                                                                                                                                                                                                                     |
| <ol style="list-style-type: none"> <li>1. Guido van Rossum, Python Reference Manual – <a href="https://docs.python.org/3/">https://docs.python.org/3/</a></li> <li>2. Bill Lubanovic, <i>Introducing Python: Modern Computing in Simple Packages</i>, O'Reilly Media, 2019.</li> <li>3. Wes McKinney, <i>Python for Data Analysis</i>, 3rd Edition, O'Reilly Media, 2022.</li> </ol> |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                                                                                         |

1. NPTEL – Programming, Data Structures and Algorithms using Python, IIT Madras: <https://nptel.ac.in/courses/106106145>
2. Python Official Documentation & Tutorials: <https://docs.python.org/3/tutorial/>
3. Pygame Official Documentation: <https://www.pygame.org/docs/>

| CO-PO Mapping |     |     |     |     |     |     |     |     |     |      |      |      |      |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| Cos           | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
| CO1           | 3   | 2   | 2   | 1   | -   | 1   | -   | -   | 2   | 1    | -    | 3    | 2    |
| CO2           | 3   | 3   | 2   | 1   | -   | -   | -   | -   | 2   | -    | -    | 3    | 2    |
| CO3           | 3   | 3   | 2   | 2   | -   | -   | -   | -   | 2   | 1    | -    | 3    | 3    |
| CO4           | 3   | 2   | 2   | 3   | 1   | -   | -   | -   | 1   | 1    | -    | 3    | 2    |
| CO5           | 2   | 2   | 3   | 2   | 2   | 1   | -   | -   | 2   | 1    | -    | 3    | 2    |

| Assessment Methodology                            | Assessment Tools | Marks |
|---------------------------------------------------|------------------|-------|
| Objective                                         | Observation      | 10    |
| Record Work                                       |                  | 10    |
| Model Exam                                        |                  | 15    |
| Virtual Lab Assignment / Online Coding Assessment | Review           | 10    |
| Model Creation                                    | Presentation     | 05    |
| Attendance                                        |                  | 10    |
| Total                                             |                  | 60    |

| MEL26102 | <i>ENGINEERING WORKSHOP LABORATORY</i> | CATEGORY | L | T | P | CREDIT |
|----------|----------------------------------------|----------|---|---|---|--------|
|          |                                        | ESC      | 0 | 0 | 3 | 1.5    |

#### Course Prerequisite / Preamble

- This laboratory course provides practical exposure to basic manufacturing and workshop practices used in engineering applications.
- Students gain hands-on training in fitting, welding, carpentry, sheet metal, and lathe operations with emphasis on safety and skill development.

#### Course Objective

- To familiarize students with common workshop tools and equipment.
- To develop practical skills in fitting, welding, carpentry, sheet metal, and lathe operations.
- To train students in safe handling of workshop machines and materials.
- To enhance fabrication and assembly skills through practical exercises.
- To provide exposure to basic manufacturing processes and engineering practices.

#### Course Outcome

|     |                                                                                           |           |
|-----|-------------------------------------------------------------------------------------------|-----------|
| CO1 | Identify and use workshop tools and measuring instruments safely.                         | <b>K3</b> |
| CO2 | Perform fitting and carpentry operations for simple engineering jobs.                     | <b>K3</b> |
| CO3 | Carry out basic welding and sheet metal fabrication operations                            | <b>K3</b> |
| CO4 | Operate basic lathe machines for simple machining processes.                              | <b>K3</b> |
| CO5 | Demonstrate teamwork, safety practices, and professional ethics in workshop environments. | <b>K4</b> |

#### FITTING SHOP

1. Introduction to fitting tools and safety practices.
2. Marking, sawing, filing, and drilling operations.
3. Preparation of fitting joints and assemblies.
4. Inspection and finishing operations.

|                                                              |
|--------------------------------------------------------------|
| <b>WELDING SHOP</b>                                          |
| 1. Introduction to welding equipment and safety precautions. |
| 2. Arc welding practice on mild steel plates.                |
| 3. Preparation of lap joint and butt joint.                  |
| 4. Finishing and inspection of welded joints.                |

|                                                                |
|----------------------------------------------------------------|
| <b>CARPENTRY SHOP</b>                                          |
| 1. Introduction to carpentry tools and wood working practices. |
| 2. Marking, cutting, planning, and chiselling operations.      |
| 3. Preparation of wooden joints.                               |
| 4. Finishing and inspection of carpentry work.                 |

|                                                             |
|-------------------------------------------------------------|
| <b>SHEET METAL SHOP</b>                                     |
| 1. Introduction to sheet metal tools and safety procedures. |
| 2. Sheet metal cutting, bending, and folding operations.    |
| 3. Preparation of simple sheet metal models.                |
| 4. Riveting and finishing operations.                       |

|                                                        |
|--------------------------------------------------------|
| <b>LATHE SHOP</b>                                      |
| 1. Introduction to lathe machine and machining safety. |
| 2. Facing and turning operations.                      |
| 3. Knurling, drilling, and threading operations.       |
| 4. Inspection and finishing operations.                |

**Total Hours : 45**

|                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                           |
| <ol style="list-style-type: none"> <li>1. Hajra Choudhury, Workshop Technology Vol I &amp; II, Media Promoters and Publishers.</li> <li>2. P.N. Rao, Manufacturing Technology, Tata McGraw Hill Publications.</li> <li>3. K.C. John, Mechanical Workshop Practice, PHI Learning.</li> </ol> |
| <b>Reference</b>                                                                                                                                                                                                                                                                            |
| <ol style="list-style-type: none"> <li>1. S.K. Hajra Choudhury, Elements of Workshop Technology, Media Promoters.</li> <li>2. B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai Publications.</li> <li>3. W.A.J. Chapman, Workshop Technology, Edward Arnold Publications.</li> </ol>      |

| Web / NPTEL Resources                                                                                                                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| 1. <a href="https://nptel.ac.in/courses/112107145">https://nptel.ac.in/courses/112107145</a><br>2. <a href="https://nptel.ac.in/courses/112104224">https://nptel.ac.in/courses/112104224</a><br>3. <a href="https://www.vlab.co.in/">https://www.vlab.co.in/</a><br>4. <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a> |  |  |  |  |  |  |  |  |  |  |  |

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

| Assessment Methodology                            | Assessment Tools | Marks |
|---------------------------------------------------|------------------|-------|
| Regular Laboratory Conduction                     | Observation      | 10    |
| Record Work                                       |                  | 10    |
| Model Exam                                        |                  | 15    |
| Virtual Lab Assignment / Online Coding Assessment | Review           | 10    |
| Model Creation                                    | Presentation     | 05    |
| Attendance                                        |                  | 10    |
| Total                                             |                  | 60    |

|                 |                                                |                 |          |          |          |               |
|-----------------|------------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>DTL26103</b> | <b>DESIGN THINKING AND IDEA<br/>LABORATORY</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                                | <b>ESC</b>      | <b>0</b> | <b>0</b> | <b>3</b> | <b>1.5</b>    |

#### Course Prerequisite / Preamble

- This laboratory introduces students to the basic steps of Design Thinking and simple idea development.
- Students gain hands-on practice in identifying problems, generating ideas, making simple prototypes, testing solutions, and presenting results.

#### Course Objective

- To understand the basic principles and stages of Design Thinking.
- To identify user needs and define simple engineering or societal problems.
- To generate and select useful ideas using simple ideation methods.
- To develop and test basic prototypes or models.
- To improve teamwork, communication, and presentation skills.

#### Course Outcome

|            |                                                                                             |           |
|------------|---------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b> | Understand the principles and stages of design thinking.                                    | <b>K2</b> |
| <b>CO2</b> | Identify user needs and define simple problems using basic design tools.                    | <b>K3</b> |
| <b>CO3</b> | Generate and select suitable ideas using simple ideation techniques.                        | <b>K4</b> |
| <b>CO4</b> | Develop and test a basic prototype for a selected problem.                                  | <b>K4</b> |
| <b>CO5</b> | Demonstrate teamwork, communication, and presentation skills through an idea-based project. | <b>K4</b> |

1. Introduction to design thinking and innovation process.
2. Observation, empathy, and user needs – simple empathy map.
3. Problem identification and problem statement.
4. Brainstorming and mind mapping for idea generation.
5. Idea screening and selection based on usefulness and feasibility

|                                                                                           |
|-------------------------------------------------------------------------------------------|
| 6. Concept sketching and simple solution planning.                                        |
| 7. Low-cost prototype development using paper, cardboard, foam, or simple digital models. |
| 8. Prototype testing and collection of user feedback.                                     |
| 9. Iteration and improvement of the prototype.                                            |
| 10. Select an engineering or societal problem and prepare an idea proposal.               |
| 11. Develop and document a simple model or demonstration prototype.                       |
| 12. Demonstrate the project and present the outcome with viva voce.                       |
| 13. Simple product improvement and sustainable idea development                           |
| 14. Idea communication using poster, pitch, or storyboard.                                |
| 15. Final presentation and peer evaluation.                                               |

**Total Hours : 45**

|                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                        |
| <ol style="list-style-type: none"> <li>1. Tim Brown, Change by Design, Harper Business Publications.</li> <li>2. Vijay Kumar, 101 Design Methods, Wiley Publications.</li> <li>3. Idris Mootee, Design Thinking for Strategic Innovation, Wiley Publications.</li> </ol>                                                 |
| <b>Reference</b>                                                                                                                                                                                                                                                                                                         |
| <ol style="list-style-type: none"> <li>1. Peter Rowe, Design Thinking, MIT Press.</li> <li>2. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Bloomsbury Publications.</li> <li>3. Roger Martin, The Design of Business, Harvard Business Review Press.</li> </ol>                             |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                             |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/110106124">https://nptel.ac.in/courses/110106124</a></li> <li>2. <a href="https://www.ideou.com/">https://www.ideou.com/</a></li> <li>3. <a href="https://www.interaction-design.org/">https://www.interaction-design.org/</a></li> </ol> |

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

| <b>Assessment Methodology</b>                     | <b>Assessment Tools</b> | <b>Marks</b> |
|---------------------------------------------------|-------------------------|--------------|
| Regular Laboratory Conduction                     | Observation             | 10           |
| Record Work                                       |                         | 10           |
| Model Exam                                        |                         | 15           |
| Virtual Lab Assignment / Online Coding Assessment | Review                  | 10           |
| Model Creation                                    | Presentation            | 05           |
| Attendance                                        |                         | 10           |
| Total                                             |                         | 60           |

| <b>CDC26101</b> | <b>CAREER DEVELOPMENT SKILL-I</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|-----------------|-----------------------------------|-----------------|----------|----------|----------|---------------|
|                 |                                   | CDS             | 0        | 0        | 2        | 1             |

|                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                         |
| <ul style="list-style-type: none"> <li>• Basic understanding of English communication and grammar.</li> <li>• Interest in developing aptitude and reasoning skills.</li> <li>• Willingness to participate in communication and personality development activities.</li> </ul> |
| <b>Course Objective</b>                                                                                                                                                                                                                                                       |
| <ul style="list-style-type: none"> <li>• To improve communication and interpersonal skills.</li> <li>• To develop aptitude and logical reasoning abilities.</li> <li>• To enhance confidence and professional skills.</li> </ul>                                              |

| Course Outcome |                                                                                                                  |    |
|----------------|------------------------------------------------------------------------------------------------------------------|----|
| CO1            | Develop effective verbal and non-verbal communication skills for academic and professional environments.         | K2 |
| CO2            | Apply basic quantitative aptitude concepts to solve numerical and logical problems efficiently.                  | K2 |
| CO3            | Demonstrate improved vocabulary, grammar, and sentence construction skills for professional communication.       | K2 |
| CO4            | Analyze and solve basic reasoning and analytical problems using logical thinking techniques.                     | K3 |
| CO5            | Exhibit positive attitude, teamwork, confidence, and time management skills for personal and career development. | K2 |

|                                                                                                                                                                            |                                       |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------|
| <b>Syllabus</b>                                                                                                                                                            |                                       |            |
| <b>Unit 1</b>                                                                                                                                                              | <b>Communication Fundamentals</b>     | <b>(6)</b> |
| Basics of Communication, Verbal and Non-Verbal Communication, Listening Skills, Introduction to Public Speaking, Self Introduction Techniques, and Professional Etiquette. |                                       |            |
| <b>Unit 2</b>                                                                                                                                                              | <b>Vocabulary Development</b>         | <b>(6)</b> |
| Synonyms & Antonyms, Word Formation, Commonly Confused Words, One Word Substitution, Sentence Construction, and Basic Grammar Usage.                                       |                                       |            |
| <b>Unit 3</b>                                                                                                                                                              | <b>Quantitative Aptitude – Basics</b> | <b>(6)</b> |

|                                                                                                                            |                                         |            |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------|
| Number System, Simplification, HCF & LCM, Percentages, Ratio & Proportion, and Average Problems.                           |                                         |            |
| <b>Unit 4</b>                                                                                                              | <b>Logical Reasoning – Introduction</b> | <b>(6)</b> |
| Coding & Decoding, Series Completion, Blood Relations, Direction Sense Test, Odd One Out, and Basic Analytical Thinking.   |                                         |            |
| <b>Unit 5</b>                                                                                                              | <b>Personality Development</b>          | <b>(6)</b> |
| Goal Setting, Positive Attitude, Confidence Building, Time Management, Team Work Activities, and Stress Management Basics. |                                         |            |

**Total Hours : 30**

|                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                            |
| 1. R.S. Aggarwal, <i>Quantitative Aptitude</i> , S. Chand Publications.<br>2. Barun K. Mitra, <i>Personality Development and Soft Skills</i> , Oxford University Press.<br>3. S.P. Dhanavel, <i>English and Soft Skills</i> , Orient BlackSwan Publications. |
| <b>Reference</b>                                                                                                                                                                                                                                             |
| 1. Norman Lewis, <i>Word Power Made Easy</i> , Goyal Publishers.<br>2. M. Tyra, <i>Magical Book on Quicker Maths</i> , BSC Publishing.<br>3. Dale Carnegie, <i>How to Win Friends and Influence People</i> , Simon & Schuster.                               |

| <b>CO PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| <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>PO12</b> |
| CO1                  | 1          | -          | -          | -          | -          | -          | -          | 2          | 2          | 3           | -           | 2           |
| CO2                  | 1          | -          | -          | -          | -          | -          | -          | 1          | -          | 3           | -           | 2           |
| CO3                  | 3          | 2          | -          | 1          | -          | -          | -          | -          | -          | -           | -           | 2           |
| CO4                  | 2          | 3          | 1          | 2          | -          | -          | -          | -          | -          | -           | -           | 2           |
| CO5                  | -          | -          | -          | -          | -          | -          | -          | 2          | 3          | 2           | 1           |             |

| <b>Assessment Methodology</b>      |                                       |       |
|------------------------------------|---------------------------------------|-------|
| Assessment Methodology             | Assessment Tools                      | Marks |
| Continuous Internal Assessment     | Observation / Record Work / Viva Voce | 30    |
| Internal Practical Examination     | Laboratory Performance                | 30    |
| End Semester Practical Examination | Experiment and Viva Voce              | 40    |
| Total                              |                                       | 100   |

|                 |                                        |                 |          |          |          |               |
|-----------------|----------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>PEC26101</b> | <b>PHYSICAL EDUCATION AND TRAINING</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                        | -               | 0        | 0        | 1        | -             |

### Course Prerequisite / Preamble

- This course focuses on physical fitness, sports participation, health awareness, and personality development through regular physical education and training activities. Students gain practical exposure to physical exercises, fitness training, sports skills, recreational activities, and wellness practices that contribute to overall physical and mental well-being.
- The course promotes discipline, teamwork, leadership, sportsmanship, and healthy lifestyle habits.

### Course Objective

- To promote physical fitness and healthy lifestyle practices among students.
- To develop interest and participation in sports and physical activities.
- To improve physical endurance, flexibility, coordination, and mental fitness.
- To encourage teamwork, discipline, leadership, and sportsmanship qualities.
- To create awareness about health, nutrition, and wellness practices.

### Course Outcome

|            |                                                                                                           |    |
|------------|-----------------------------------------------------------------------------------------------------------|----|
| <b>CO1</b> | Understand the importance of physical fitness, sports, and healthy lifestyle practices.                   | K2 |
| <b>CO2</b> | Perform basic physical exercises and fitness activities effectively.                                      | K3 |
| <b>CO3</b> | Demonstrate participation in sports and recreational activities with discipline and teamwork.             | K2 |
| <b>CO4</b> | Apply health, hygiene, nutrition, and wellness practices for physical well-being.                         | K4 |
| <b>CO5</b> | Develop leadership qualities, sportsmanship, and positive attitude through physical education activities. | K3 |

### LIST OF ACTIVITIES

1. Introduction to physical fitness, health awareness, and importance of physical education.
2. Warm-up exercises, stretching, and flexibility training.

3. Physical fitness exercises for endurance, strength, and coordination.
4. Practice sessions in athletics – running, relay, jumping, and basic field events.
5. Training in indoor and outdoor sports activities.
6. Team games and recreational activities for teamwork and leadership development.
7. Yoga, breathing exercises, and relaxation techniques for mental wellness.
8. Awareness programme on nutrition, hygiene, and healthy lifestyle practices.
9. Participation in sports events, fitness competitions, and physical training drills.
10. Physical fitness assessment, activity record submission, and performance evaluation.

#### **GUIDELINES**

1. Students shall actively participate in all physical education and sports activities.
2. Proper sports attire and discipline shall be maintained during training sessions.
3. Students shall follow safety measures and instructor guidelines during physical activities.
4. Participation in fitness assessments, sports events, and wellness programmes is mandatory.
5. Students shall maintain an activity record / fitness logbook throughout the course.
6. Attendance and regular participation are essential for successful completion of the course.

#### **Reference**

1. Physical Education and Sports Training Manuals.
2. Ministry of Youth Affairs and Sports – Fitness Guidelines.
3. Yoga and Wellness Practice Handbooks.
4. Health and Nutrition Awareness Materials.

#### **Web / NPTEL Resources**

1. <https://yas.nic.in/>
2. <https://fitindia.gov.in/>
3. <https://nptel.ac.in/>
4. <https://www.who.int/health-topics/physical-activity>

| <b>CO PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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                  | 2          | 3          | 2          | 2          | -          | -          | -          | 2          | 3          | 3           | 1           | 2           | 2           |
| CO2                  | 2          | 3          | 2          | 2          | -          | -          | -          | 2          | 3          | 3           | 1           | 2           | 2           |
| CO3                  | 2          | 3          | 2          | 2          | -          | -          | -          | 2          | 3          | 3           | 1           | 2           | 2           |
| CO4                  | 2          | 3          | 2          | 2          | -          | -          | -          | 2          | 3          | 3           | 1           | 2           | 2           |
| CO5                  | 2          | 3          | 2          | 2          | -          | -          | -          | 2          | 3          | 3           | 1           | 2           | 2           |

| <b>Assessment Methodology</b> |                                                               |              |
|-------------------------------|---------------------------------------------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b>                                       | <b>Marks</b> |
| Participation and Performance | Physical Activities / Sports Participation / Fitness Training | 40           |
| Physical Fitness Evaluation   | Endurance, Flexibility, and Skill Assessment                  | 30           |
| Activity Record / Fitness     | Logbook Documentation and Reflection                          | 20           |
| Discipline and Attendance     | Regularity, Conduct, and Team Participation                   | 10           |
| Total                         |                                                               | 100          |

\*Slightly it can be varied based on the requirement, necessity and weightage

# SEMESTER – II

|          |                                                                 |                 |          |          |          |               |
|----------|-----------------------------------------------------------------|-----------------|----------|----------|----------|---------------|
| MAC26201 | <b><i>PARTIAL DIFFERENTIAL<br/>EQUATIONS AND TRANSFORMS</i></b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|          |                                                                 | BSC             | 3        | 1        | 0        | 4             |

### Course Prerequisite / Preamble

- Basic knowledge of Engineering Mathematics – I, calculus, differential equations, and complex numbers.
- Understanding of integration, matrices, and elementary transforms.
- This course is designed to provide students with mathematical tools required for solving engineering problems involving complex variables, Laplace transforms, inverse Laplace transforms, and Fourier transforms. The course develops analytical and problem-solving skills for applications in engineering systems, signal processing, heat transfer, fluid mechanics, and control systems.

### Course Objective

- To formulate and solve problems involving analytic functions and conformal mappings.
- To understand and apply Taylor and Laurent series expansions for complex functions.
- To understand Laplace transforms and their properties.
- To apply Laplace transforms in solving ordinary differential equations and simultaneous differential equations.
- To understand and apply Fourier transform techniques and their engineering applications.

### Course Outcome

|     |                                                                                                                                                                      |    |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| CO1 | Apply the concepts of analytic functions, Cauchy–Riemann equations, harmonic functions, and construction of analytic functions in solving complex variable problems. | K3 |
| CO2 | Analyze conformal and bilinear transformations, perform Taylor and Laurent series expansions, and classify singularities of complex functions.                       | K4 |
| CO3 | Understand the Laplace transform and its properties for engineering applications.                                                                                    | K3 |
| CO4 | Apply Laplace transforms to solve ordinary differential equations with constant coefficients and simultaneous ordinary differential equations.                       | K4 |
| CO5 | Understand and apply Fourier transform techniques including Fourier integral theorem, convolution, and Parseval's identity.                                          | K4 |

| Syllabus                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------|
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Derivatives</b>       | <b>(12)</b> |
| Continuity, derivative and analytic functions – Necessary conditions – Cauchy Riemann equations (Cartesian and polar form) and sufficient conditions (excluding proof) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions.                                                                                                                                                                                      |                          |             |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Complex Functions</b> | <b>(12)</b> |
| Conformal mapping – Simple and standard transformations like $w = z + c$ , $cz$ , $z^2$ , $e^z$ , $\sin z$ , $\cosh z$ and $z + \frac{1}{z}$ – Bilinear transformation and cross ratio property (excluding Schwarz-Christoffel transformation).<br>Taylor's and Laurent's theorem (without proof) – Series expansion of complex valued functions – Classification of singularities.                                                                         |                          |             |
| <b>UNIT III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Transformations</b>   | <b>(12)</b> |
| Existence conditions – transforms of elementary functions – properties – transform of unit step function and unit impulse function – transforms of derivatives and integrals – transforms of periodic functions – initial and final value theorems. Inverse Laplace transforms – properties – convolution theorem – application to solution of ordinary differential equations with constant coefficients and simultaneous ordinary differential equations. |                          |             |
| <b>UNIT IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Fourier</b>           | <b>(12)</b> |
| Fourier Integral theorem (statement only) – Fourier transform and its inverse – Fourier sine and cosine transforms – properties of Fourier transforms – convolution and Parseval's identity.                                                                                                                                                                                                                                                                |                          |             |
| <b>UNIT V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Laplace</b>           | <b>(12)</b> |
| Applications of Laplace and Fourier transforms in engineering problems – heat transfer analysis – vibration systems – electrical circuits – signal processing – boundary value problems.                                                                                                                                                                                                                                                                    |                          |             |

**Total Hours: 60**

|                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                             |
| 1. Veerarajan T., <i>Engineering Mathematics for First Year</i> , Tata McGraw Hill, 2010.                                     |
| 2. Venkataraman M.K., <i>Engineering Mathematics, Vol. II &amp; III</i> , National Publishing Company, Chennai, 2012.         |
| 3. B.S. Grewal, <i>Higher Engineering Mathematics</i> , Khanna Publishers, Delhi, 2007.                                       |
| <b>Reference</b>                                                                                                              |
| 1. Erwin Kreyszig, <i>Advanced Engineering Mathematics</i> , 7th Edition, Wiley India, 2007.                                  |
| 2. Bali N.P. and Manish Goyal, <i>Text Book of Engineering Mathematics</i> , 3rd Edition, Laxmi Publications Pvt. Ltd., 2008. |
| 3. Grewal B.S., <i>Higher Engineering Mathematics</i> , 40th Edition, Khanna Publishers, Delhi, 2007.                         |

|                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------|
| <b>Web / NPTEL Resources</b>                                                                                             |
| 1. NPTEL – Advanced Engineering Mathematics: <a href="https://nptel.ac.in">https://nptel.ac.in</a>                       |
| 2. MIT OpenCourseWare – Differential Equations and Linear Algebra: <a href="https://ocw.mit.edu">https://ocw.mit.edu</a> |
| 3. Khan Academy – Laplace and Fourier Transforms: <a href="https://www.khanacademy.org">https://www.khanacademy.org</a>  |

| <b>CO PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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          | -          | -          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO2                  | 3          | 3          | -          | 1          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO3                  | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO4                  | 3          | 3          | 2          | 1          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO5                  | 3          | 3          | 2          | 2          | -          | -          | -          | -          | -          | -           | -           | 2           | 2           |

| <b>Assessment Methodology</b>  |                         |              |
|--------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b>  | <b>Assessment Tools</b> | <b>Marks</b> |
| Continuous Internal Assessment | Assignment / Tutorial   | 10           |
| Internal Test I                | Written Examination     | 05           |
| Internal Test II               | Written Examination     | 05           |
| Model Examination              | Written Examination     | 10           |
| Attendance                     | Performance             | 10           |
| Total                          |                         | 40           |

|                                                                                                                                                                                                                                                                           |                                            |                 |          |          |          |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>ENC26202</b>                                                                                                                                                                                                                                                           | <b>TECHNICAL ENGLISH AND COMMUNICATION</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                                                                                                                                                                                                                                                                           |                                            | BSC             | 3        | 0        | 0        | 3             |
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                     |                                            |                 |          |          |          |               |
| <ul style="list-style-type: none"><li>Enhances communication skills for academic and professional environments.</li><li>Develops LSRW skills for engineering students.</li><li>Focuses on technical, interpersonal, and employability communication skills.</li></ul>     |                                            |                 |          |          |          |               |
| <b>Course Objective</b>                                                                                                                                                                                                                                                   |                                            |                 |          |          |          |               |
| <ul style="list-style-type: none"><li>To develop effective LSRW skills for academic and professional communication.</li><li>To enhance technical and workplace communication skills.</li><li>To improve employability and professional communication practices.</li></ul> |                                            |                 |          |          |          |               |

|                       |                                                                                          |    |
|-----------------------|------------------------------------------------------------------------------------------|----|
| <b>Course Outcome</b> |                                                                                          |    |
| <b>CO1</b>            | Apply effective communication principles in academic and professional contexts           | K3 |
| <b>CO2</b>            | Demonstrate reading comprehension and analytical skills using technical materials        | K3 |
| <b>CO3</b>            | Prepare structured technical and professional documents                                  | K4 |
| <b>CO4</b>            | Demonstrate oral communication skills through presentations, discussions, and interviews | K3 |
| <b>CO5</b>            | Use grammar, vocabulary, and workplace communication effectively in engineering contexts | K3 |

|                                                                                                                                                                                                                                                                                                                                                           |                                                |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------|
| <b>Syllabus</b>                                                                                                                                                                                                                                                                                                                                           |                                                |            |
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                                                             | <b>Fundamentals Of Technical Communication</b> | <b>(9)</b> |
| Introduction to Communication – Process of Communication – Verbal and Non-verbal Communication<br>– Barriers to Communication – Principles of Effective Communication – Seven C’s of Communication<br>– Technical Communication in Engineering – Formal and Informal Communication – Digital Communication Etiquette – Listening Skills – Reading Skills. |                                                |            |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                                                                                             | <b>Reading And Language Development</b>        | <b>(9)</b> |
| Reading Techniques – Skimming – Scanning – Intensive and Extensive Reading – Reading Technical Articles, Manuals and Reports – Vocabulary Building – Root Words – Prefixes and Suffixes – Synonyms and Antonyms – Homophones and Homonyms – One-word Substitutes – Abbreviations and Acronyms – Contextual Meaning.                                       |                                                |            |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                                                             | <b>Professional Writing Skills</b>             | <b>(9)</b> |

|                                                                                                                                                                                                                                                                                                                                       |                                                         |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------|
| Sentence Structures – Paragraph Development – Coherence and Cohesion – Technical Description – Process Writing – Email Writing – Business Letters – Memorandum – Meeting Minutes – Resume Writing – Report Writing – Essay Writing – Instructions and Recommendations.                                                                |                                                         |            |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                                         | <b>Oral Communication and Presentation Skills</b>       | <b>(9)</b> |
| Phonetics and Pronunciation – Stress and Intonation – Public Speaking – JAM Sessions – Group Discussions – Debates – Role Plays – Technical Presentations – Presentation Tools and Visual Aids – Interview Skills – Corporate Communication Etiquette.                                                                                |                                                         |            |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                                         | <b>Workplace Communication and Employability Skills</b> | <b>(9)</b> |
| Grammar for Professional Communication – Subject Verb Agreement – Articles and Prepositions – Error Correction – Punctuation – Common Workplace Errors – Indianisms – Cross-cultural Communication – Communication in Teams – Workplace Ethics – Communication for Innovation and Entrepreneurship – AI-assisted Communication Tools. |                                                         |            |

**Total Hours: 45**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <ul style="list-style-type: none"> <li>• Technical Communication: English Skills for Engineers Meenakshi Raman &amp; Sangeeta Sharma, Oxford University Press, New Delhi, 2nd Edition, 2009.</li> <li>• Effective Technical Communication, M. Ashraf Rizvi, McGraw Hill Education, New Delhi, 2nd Edition, 2017.</li> <li>• Business Communication Today, Courtland L. Bovee &amp; John V. Thill, Pearson Education, 14th Edition, 2018.</li> <li>• Communicative English for Engineers and Professionals, Nitin Bhatnagar &amp; Mamta Bhatnagar, Pearson Longman, 2009.</li> </ul> |
| <b>Reference:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>• Practical English Usage, Michael Swan, Oxford University Press, 4th Edition, 2016.</li> <li>• Advanced Grammar in Use, Martin Hewings, Cambridge University Press, 3rd Edition, 2013.</li> <li>• The Elements of Style, William Strunk Jr. &amp; E.B. White, Pearson Education, 4th Edition, 2000.</li> </ul>                                                                                                                                                                                                                              |
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ol style="list-style-type: none"> <li>1. <a href="https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_hs34">https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_hs34</a></li> <li>2. <a href="https://onlinecourses.nptel.ac.in/e-learning/preview/noc19_hs33">https://onlinecourses.nptel.ac.in/e-learning/preview/noc19_hs33</a></li> <li>3. <a href="https://onlinecourses.nptel.ac.in/e-learning">https://onlinecourses.nptel.ac.in/e-learning</a></li> </ol>                                                                                                    |

| <b>CO PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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                  | 1          | 1          | -          | -          | -          | 2          | -          | 1          | 2          | 3           | -           | 1           | -           |
| CO2                  | 1          | 2          | -          | 1          | -          | -          | -          | -          | 1          | 3           | -           | 1           | 1           |
| CO3                  | 1          | 2          | 1          | -          | 1          | -          | -          | 1          | 2          | 3           | -           | 2           | 1           |
| CO4                  | -          | -          | -          | -          | -          | 1          | -          | 1          | 3          | 3           | -           | 1           | 2           |
| CO5                  | 1          | 1          | -          | -          | 1          | 2          | -          | 2          | 2          | 3           | 1           | 1           | 1           |

| <b>Assessment Methodology</b>  |                         |              |
|--------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b>  | <b>Assessment Tools</b> | <b>Marks</b> |
| Continuous Internal Assessment | Assignment / Tutorial   | 10           |
| Internal Test I                | Written Examination     | 05           |
| Internal Test II               | Written Examination     | 05           |
| Model Examination              | Written Examination     | 10           |
| Attendance                     | Performance             | 10           |
| Total                          |                         | 40           |

|           |                                              |          |   |   |   |        |
|-----------|----------------------------------------------|----------|---|---|---|--------|
| EEEC26203 | BASIC ELECTRICAL AND ELECTRONICS ENGINEERING | CATEGORY | L | T | P | CREDIT |
|           |                                              | ESC      | 3 | 0 | 0 | 3      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>• Introduce the fundamentals of electrical circuits and basic electrical quantities.</li> <li>• Provide basic knowledge of DC, AC and magnetic circuits.</li> <li>• Develop understanding of electrical wiring, safety, protection and earthing.</li> <li>• Introduce semiconductor devices and basic electronic circuits.</li> <li>• Provide fundamental knowledge of digital electronics and operational amplifiers.</li> </ul>                                                                                                     |
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul style="list-style-type: none"> <li>• Introduce the basic concepts of electrical circuits, DC and AC circuits, and magnetic circuits.</li> <li>• Develop fundamental knowledge of electrical wiring, safety practices, protection devices and earthing.</li> <li>• Introduce the operating principles and basic applications of semiconductor electronic devices.</li> <li>• Provide fundamental knowledge of digital electronics, logic gates and basic digital circuits.</li> <li>• Introduce the basic concepts and applications of operational amplifiers.</li> </ul> |

|                       |                                                                                                                              |           |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Course Outcome</b> |                                                                                                                              |           |
| <b>CO1</b>            | Apply basic laws and principles to analyze simple DC and magnetic circuits.                                                  | <b>K2</b> |
| <b>CO2</b>            | Analyze basic AC circuits and determine voltage, current, power and power factor.                                            | <b>K3</b> |
| <b>CO3</b>            | Explain basic electrical wiring, safety practices, protection devices, cables and earthing.                                  | <b>K2</b> |
| <b>CO4</b>            | Explain the working principles and basic applications of semiconductor devices such as diodes, transistors, JFET and MOSFET. | <b>K2</b> |
| <b>CO5</b>            | Apply basic concepts of logic gates, digital circuits and operational amplifiers to simple electronic applications.          | <b>K3</b> |

| <b>Syllabus</b>                                                                                                                                                                                                                                                                                                     |                                       |                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------|
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                       | <b>DC AND MAGNETIC CIRCUITS</b>       | <b>9 hours</b> |
| Voltage, current, power and energy - Basic electrical circuits - Ohm's law - Kirchhoff's laws - Series and parallel circuits - Voltage and current division - Basic network analysis - Magnetic circuits - Magnetic materials - Electromagnetic induction - Faraday's law - Lenz's law - Self and mutual induction. |                                       |                |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                                                       | <b>AC CIRCUITS</b>                    | <b>9 hours</b> |
| AC fundamentals – AC waveform– RMS and average values – R, L, and C circuits – Phasors – Impedance -AC power – Power factor- Single-phase and three-phase circuits – Star and Delta connections – Line and phase values                                                                                             |                                       |                |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                       | <b>ELECTRICAL WIRING AND SAFETY</b>   | <b>9 hours</b> |
| Electrical safety - Electrical tools - Wiring types - Domestic wiring - Basic lighting circuits - Fuses and circuit breakers - Electrical shock and protection - Industrial wiring - Cables and conductors - Earthing - Electrical installation - Basic energy audit and ECAD.                                      |                                       |                |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                       | <b>BASIC ELECTRONIC DEVICES</b>       | <b>9 hours</b> |
| Semiconductors – PN Junction Diode – Forward and Reverse Bias – Zener Diode – LED – Photodiode – Basic Rectifiers – BJT: NPN and PNP – JFET and MOSFET – Basic Applications.                                                                                                                                        |                                       |                |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                       | <b>DIGITAL ELECTRONICS AND OP-AMP</b> | <b>9 hours</b> |
| Basic Number Systems – Logic Gates – Boolean Algebra – Half Adder and Full Adder – Basic Flip-Flops – Counters – Shift Registers – Introduction to Op-Amp – Inverting and Non-Inverting Amplifiers – Integrator – Differentiator – Comparator.                                                                      |                                       |                |

**Total Hours: 45**

|                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                        |
| 1. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, McGraw Hill Education.<br>2. S. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Education.                                                                                                                |
| <b>Reference:</b>                                                                                                                                                                                                                                                                                         |
| 1. V. K. Mehta and Rohit Mehta, Principles of Electrical Engineering, S. Chand Publishing.<br>2. Thomas L. Floyd, Electronic Devices, Pearson Education.<br>3. M. Morris Mano, Digital Logic and Computer Design, Pearson Education.<br>4. R. P. Jain, Modern Digital Electronics, McGraw Hill Education. |
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>· NPTEL – Basic Electrical Engineering</li> <li>· NPTEL – Electrical Circuits</li> <li>· NPTEL – Basic Electronics</li> <li>· NPTEL – Digital Circuits</li> <li>· NPTEL – Analog Electronic Circuits</li> </ul>                                                    |

### **CO-PO Mapping**

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

| <b>Assessment Methodology</b>  |                         |              |
|--------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b>  | <b>Assessment Tools</b> | <b>Marks</b> |
| Continuous Internal Assessment | Assignment / Tutorial   | 10           |
| Internal Test I                |                         | 05           |
| Internal Test II               |                         | 05           |
| Model Examination              | Review                  | 10           |
| Attendance                     |                         | 10           |
| Total                          |                         | 40           |

|                 |                                                        |                 |          |          |          |               |
|-----------------|--------------------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>PCT26204</b> | <b>PHYSICS AND CHEMISTRY FOR<br/>COMPUTER ENGINEER</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                                        | HSM             | 3        | 0        | 0        | 3             |
| <b>PCT26204</b> | <b>PHYSICS AND CHEMISTRY FOR<br/>COMPUTER ENGINEER</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                                        | HSM             | 3        | 0        | 0        | 3             |

|                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                     |
| <ul style="list-style-type: none"> <li>• Basic knowledge of Physics and Chemistry at Higher Secondary level.</li> <li>• Understanding of elementary concepts in materials science and electrochemistry.</li> <li>• Foundation for engineering applications involving materials, optics, water treatment, and energy systems.</li> </ul>   |
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>• To make the students understand the importance in studying electrical properties of materials, semiconductor physics, wave function in quantum mechanics and its practical application in technologies.</li> <li>• To make the students understand the importance of water and cells.</li> </ul> |

|                                                                             |                                                                                                                                                                                         |           |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Course Outcome</b>                                                       |                                                                                                                                                                                         |           |
| <b>On the successful completion of the course, students will be able to</b> |                                                                                                                                                                                         |           |
| <b>CO1</b>                                                                  | Relate theoretical principles to real-world applications in electronics and IT hardware, fostering the ability to choose and apply suitable semiconductor devices in practical systems. | <b>K2</b> |
| <b>CO2</b>                                                                  | Understand and explain the properties of matter waves and particles in a one-dimensional infinite potential well and understand the quantization of energy levels.                      | <b>K2</b> |
| <b>CO3</b>                                                                  | Compile the basic physics laws and principles in the respective field for different applications                                                                                        | <b>K2</b> |
| <b>CO4</b>                                                                  | Explain the concepts of Water Chemistry in the context of industrial usage                                                                                                              | <b>K2</b> |
| <b>CO5</b>                                                                  | Discover the fundamental concepts of electrode potential in view of practical applications                                                                                              | <b>K2</b> |

| Syllabus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                            |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------|
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Semiconductor Physics</b>               | <b>9</b> |
| Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type& P-type semiconductors – Carrier transport: Velocity-electric field relations – drift and diffusion transport – Einstein’s relation – Hall effect and devices – Zener and avalanche breakdown in p-n junctions - Ohmic contacts – tunnel diode - Schottky diode – MOS capacitor - power transistor. |                                            |          |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Quantum Physics</b>                     | <b>9</b> |
| De Broglie hypothesis of matter waves; properties of matter wave; Wave function; Physical interpretation of wave function; Heisenberg uncertainty principle; non existence of electron in nucleus; Schrodinger’s time dependent wave equation; time independent wave equation; Particle trapped in one-dimensional infinite potential well, – tunneling (qualitative) - scanning tunneling microscope, Quantum Computing.                                                                                |                                            |          |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Optics And Lasers</b>                   | <b>9</b> |
| <b>Interference:</b> Air-wedge –Newton’s rings –Michelson’s interferometer –Determination of Wavelength of a Monochromatic Light Source.<br><b>Diffraction:</b> Rayleigh’s criterion –resolving power of grating and prism.<br><b>Lasers:</b> Principles of laser –Spontaneous and Stimulated emissions –Einstein’s theory of Matter Radiation interaction –A and B coefficients –Types of Lasers –GaAs laser.                                                                                           |                                            |          |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Water Chemistry</b>                     | <b>9</b> |
| Water chemistry-hard and soft water, Determination of hardness by EDTA method Disadvantages of hard water- Boiler Scales, sludges, Softening of water: Internal conditioning, External conditioning - ion exchange and zeolite processes. Desalination-Reverse osmosis.                                                                                                                                                                                                                                  |                                            |          |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Electrochemical Cells And Corrosion</b> | <b>9</b> |
| Electrode potential, electromotive force, reference electrodes-hydrogen, Ag/AgCl, calomel and glass electrodes. Nernst equation and applications. Batteries- Dry cell, alkaline battery, Ni-Cd battery and lead-acid battery. Fuel Cell-Hydrogen-oxygen fuel cell. Corrosion-dry and wet corrosion, mechanism and types of electrochemical corrosion. Corrosion control methods.                                                                                                                         |                                            |          |

**Total Hours: 45**

| Text Books                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. Umesh K Mishra &amp; Jasprit Singh, “Semiconductor Device Physics and Design”, Springer, 2008.</li> <li>2. Bhattacharya, D.K. &amp; Poonam, T. —Engineering PhysicsII. Oxford University Press, 2015.</li> <li>3. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi, 17 ED, (2020-21).</li> </ol> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>Reference Books</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <ol style="list-style-type: none"> <li>1. Y.B.Band and Y. Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.</li> <li>2. Avadhanulu M. N., P. G. Kshirsagar, A text book of Engineering Physics, Radiant publishers, 2017.</li> <li>3. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S. Chand and Company Ltd, New Delhi, 28<sup>th</sup> ED, 2020.</li> </ol>                                                                                                              |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <ol style="list-style-type: none"> <li>1. <a href="https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016">https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016</a></li> <li>2. <a href="https://www.coursera.org/learn/material-science-engineering">https://www.coursera.org/learn/material-science-engineering</a></li> <li>3. <a href="https://nptel.ac.in/courses/113105102">https://nptel.ac.in/courses/113105102</a></li> <li>4. <a href="https://nptel.ac.in/courses/115106121">https://nptel.ac.in/courses/115106121</a></li> </ol> |  |  |  |  |  |  |  |  |  |  |  |  |  |

| <b>CO- PO Mapping</b> |     |     |     |     |     |     |     |     |     |      |      |      |      |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| COs                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
| CO1                   | 3   | 2   | 2   | 2   | -   | -   | -   | -   | -   | -    | 1    | 1    | 1    |
| CO2                   | 3   | 2   | 3   | 2   | -   | -   | -   | -   | -   | -    | 1    | 1    | 1    |
| CO3                   | 3   | 2   | 3   | 2   | -   | -   | -   | -   | -   | -    | 1    | 1    | 1    |
| CO4                   | 3   | 1   | -   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | 3    |
| CO5                   | 3   | 1   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 3    | 2    |
| CO6                   | 3   | 1   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    | 3    |

| <b>Assessment Methodology</b>  |                       |       |
|--------------------------------|-----------------------|-------|
| Assessment Methodology         | Assessment Tools      | Marks |
| Continuous Internal Assessment | Assignment / Tutorial | 10    |
| Internal Test I                | Written Examination   | 05    |
| Internal Test II               | Written Examination   | 05    |
| Model Examination              | Written Examination   | 10    |
| Attendance                     | Performance           | 10    |
| Total                          |                       | 40    |

|                 |                         |                 |          |          |          |               |
|-----------------|-------------------------|-----------------|----------|----------|----------|---------------|
| <b>CST26205</b> | <b>PROGRAMMING IN C</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                         | ESC             | 3        | 0        | 0        | 3             |

### Course Prerequisite / Preamble

- Basic knowledge of computer fundamentals and familiarity with the use of computers, operating systems, and common application software.
- Elementary mathematical and logical reasoning skills to understand problem-solving techniques, algorithms, and flowchart design.
- Interest in programming and computational thinking, providing a foundation for learning structured programming concepts using the C language.

### Course Objective

- To introduce the fundamentals of computer systems, including hardware, software, operating systems, networking concepts, internet services, and office productivity tools.
- To develop problem-solving skills through algorithms, flowcharts, pseudo code, and program development methodologies.
- To impart knowledge of C programming fundamentals, including data types, operators, expressions, input/output operations, decision-making, and looping constructs.
- To enable students to design and develop C programs using arrays, functions, recursion, strings, structures, unions, and pointers.
- To provide practical knowledge of advanced C programming concepts, including file handling, command-line arguments, and preprocessor directives for developing efficient applications.

### Course Outcome

|            |                                                                                                                                                   |           |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b> | Explain the fundamentals of computer systems, software, operating systems, networking concepts, internet services, and office productivity tools. | <b>K2</b> |
| <b>CO2</b> | Apply problem-solving techniques such as algorithms, flowcharts, and pseudo code to develop solutions for computational problems.                 | <b>K3</b> |
| <b>CO3</b> | Develop C programs using data types, operators, expressions, decision-making, and looping constructs.                                             | <b>K3</b> |
| <b>CO4</b> | Implement modular programs using arrays, functions, recursion, strings, structures, unions, and pointers.                                         | <b>K3</b> |

|                                                                                                                                                                                                                                                                                                                                    |                                                                                                                     |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------|
| <b>CO5</b>                                                                                                                                                                                                                                                                                                                         | Design and develop C applications incorporating file handling, command-line arguments, and preprocessor directives. | <b>K4</b>  |
| <b>Syllabus</b>                                                                                                                                                                                                                                                                                                                    |                                                                                                                     |            |
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                                      | <b>History Of Computers</b>                                                                                         | <b>(9)</b> |
| History of Computers – Block diagram of a computer – Components of a Computer system – Classification of computers - Hardware – Software – Categories of Software – Operating System – Applications of Computers – Network structure – Internet and its services – Intranet – Study of word processor – Preparation of worksheets. |                                                                                                                     |            |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                                                                      | <b>Problem Solving Techniques</b>                                                                                   | <b>(9)</b> |
| Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code. Introduction to C – History of C – Importance of C - C tokens – data types – Operators and expressions – I/O functions.                                                                                             |                                                                                                                     |            |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                                      | <b>Decision Making Statements</b>                                                                                   | <b>(9)</b> |
| Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions. Storage classes – Strings – String library functions.                                                                                                                                  |                                                                                                                     |            |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                                      | <b>Arrays And Structures</b>                                                                                        | <b>(9)</b> |
| Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types – Union. Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and Structures.                                                                                              |                                                                                                                     |            |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                                      | <b>Files</b>                                                                                                        | <b>(9)</b> |
| Files – operations on a file – Random access to files – command line arguments. Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives.                                                                                          |                                                                                                                     |            |

**Total Hours: 45**

|                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                         |
| 1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, Sixth edition, 2012                                                         |
| <b>Reference:</b>                                                                                                                          |
| 1. Vikas Verma, “A Workbook on C “, Cengage Learning, Second Edition, 2012                                                                 |
| 2. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2008.                                                   |
| <b>Web / NPTEL Resources:</b>                                                                                                              |
| 1. <a href="https://nptel.ac.in/courses/106104128?utm_source">https://nptel.ac.in/courses/106104128?utm_source</a>                         |
| 2. <a href="https://onlinecourses-archive.nptel.ac.in/noc17_cs43/preview">https://onlinecourses-archive.nptel.ac.in/noc17_cs43/preview</a> |

| <b>CO PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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          | -          | -          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO2                  | 3          | 3          | -          | 1          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO3                  | 3          | 2          | 1          | -          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO4                  | 3          | 3          | 2          | 1          | -          | -          | -          | -          | -          | -           | -           | 2           | 1           |
| CO5                  | 3          | 3          | 2          | 2          | -          | -          | -          | -          | -          | -           | -           | 2           | 2           |

| <b>Assessment Methodology</b>  |                         |              |
|--------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b>  | <b>Assessment Tools</b> | <b>Marks</b> |
| Continuous Internal Assessment | Assignment / Tutorial   | 10           |
| Internal Test I                | Written Examination     | 05           |
| Internal Test II               | Written Examination     | 05           |
| Model Examination              | Written Examination     | 10           |
| Attendance                     | Performance             | 10           |
| Total                          |                         | 40           |

|                 |                                                                |                 |          |          |          |               |
|-----------------|----------------------------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>EEL26201</b> | <b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                                                | ESC             | 0        | 0        | 3        | 1.5           |

| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                    |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----|
| <ul style="list-style-type: none"> <li>Understand the basic concepts of electrical quantities and circuits.</li> <li>Apply Ohm's law, Kirchhoff's laws and basic circuit principles.</li> <li>Understand the fundamentals of AC circuits, magnetic circuits and electrical measurements.</li> <li>Gain basic knowledge of electronic devices, digital circuits and operational amplifiers.</li> <li>Develop practical skills in electrical measurements, circuit testing, wiring and safety practices.</li> </ul> |                                                                                                    |    |
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                    |    |
| <ul style="list-style-type: none"> <li>Develop practical knowledge of basic electrical circuits and measurements.</li> <li>Provide hands-on experience in DC, AC and magnetic circuit experiments.</li> <li>Develop skills in testing and analyzing electronic devices and rectifier circuits.</li> <li>Familiarize students with digital circuits, flip-flops, counters and op-amp circuits.</li> <li>Develop practical skills in circuit construction, testing, measurement</li> </ul>                          |                                                                                                    |    |
| <b>Course Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                    |    |
| <b>CO1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Verify basic electrical laws and analyze simple DC and AC circuits.                                | K2 |
| <b>CO2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Perform electrical measurements and verify magnetic and three-phase circuit principles.            | K3 |
| <b>CO3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Test and analyze the characteristics of basic electronic devices and rectifier circuits.           | K4 |
| <b>CO4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Construct and verify basic digital circuits such as logic gates, adders, flip-flops and counters.  | K3 |
| <b>CO5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Implement and analyze basic operational amplifier circuits and follow electrical safety practices. | K4 |

|                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LIST OF EXPERIMENTS</b>                                                                                                                                                                                                                                                                                                                      |
| 1. Verification of Ohm's Law and Kirchhoff's Laws.                                                                                                                                                                                                                                                                                              |
| 2. Verification of Voltage and Current Division Rules in Series and Parallel Circuits.                                                                                                                                                                                                                                                          |
| 3. Study of Magnetic Induction and Verification of Faraday's and Lenz's Laws.                                                                                                                                                                                                                                                                   |
| 4. Measurement of AC Voltage, Current and Power in R-L, R-C and R-L-C Circuits.                                                                                                                                                                                                                                                                 |
| 5. Measurement of Three-Phase Power using Two-Wattmeter Method.                                                                                                                                                                                                                                                                                 |
| 6. Study and Testing of PN Junction Diode and Zener Diode Characteristics.                                                                                                                                                                                                                                                                      |
| 7. Construction and Testing of Half-Wave and Full-Wave Rectifiers.                                                                                                                                                                                                                                                                              |
| 8. Study of BJT Characteristics and its Basic Switching Operation.                                                                                                                                                                                                                                                                              |
| 9. Verification of Basic Logic Gates and Half Adder/Full Adder.                                                                                                                                                                                                                                                                                 |
| 10. Implementation of Basic Op-Amp Circuits – Inverting, Non-Inverting Amplifier and Comparator.                                                                                                                                                                                                                                                |
| 11. Study of LED and Photodiode Characteristics.                                                                                                                                                                                                                                                                                                |
| 12. Study of Flip-Flop and Counter Circuits.                                                                                                                                                                                                                                                                                                    |
| 13. Study of Earthing and Electrical Safety Devices.                                                                                                                                                                                                                                                                                            |
| 14. Study of Domestic Wiring and Basic Lighting Circuits.                                                                                                                                                                                                                                                                                       |
| <b>Total Hours : 45</b>                                                                                                                                                                                                                                                                                                                         |
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                               |
| 1. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, McGraw Hill Education, 4th Edition, 2019.<br>2. V. K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand Publishing, 12th Edition, 2020.<br>3. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson Education, 11th Edition, 2015. |

| Reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. S. K. Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education, 2nd Edition, 2017.</li> <li>2. Thomas L. Floyd, Electronic Devices, Pearson Education, 10th Edition, 2018.</li> <li>3. M. S. Sukhija and T. K. Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press, 2nd Edition, 2019.</li> <li>4. A. K. Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai Publications, 2016.</li> </ol> |
| Web / NPTEL Resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>• <a href="#">NPTEL – Basic Electrical Circuits</a></li> <li>• <a href="#">NPTEL – Basic Electrical Engineering</a></li> <li>• <a href="#">Virtual Labs – IIT Kharagpur (Basic Electronics Lab)</a></li> <li>• <a href="#">Virtual Labs – Electrical Machines and Circuits Lab</a></li> <li>• <a href="#">MIT OpenCourseWare – Electronics and Circuits</a></li> </ul>                                                                                                                    |

### **CO-PO Mapping**

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

| Evaluation Criteria               | Assessment Methodology                                           | Marks |
|-----------------------------------|------------------------------------------------------------------|-------|
| Observation and Record            | Regular lab Observation and Record writing and timely submission | 20    |
| Model Practical Test              | Internal Practical Test                                          | 15    |
| Continuous Laboratory Performance | Lab Performance, Experiment completion                           | 10    |
| Vivo -Voce                        | Oral question during lab sessions                                | 5     |
| Attendance                        | Based on laboratory attendance percentage                        | 10    |
|                                   | Total                                                            | 60    |

|                 |                                               |                 |          |          |          |               |
|-----------------|-----------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>PCL26202</b> | <b>PHYSICS &amp; CHEMISTRY<br/>LABORATORY</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                               | <b>BSC</b>      | <b>0</b> | <b>0</b> | <b>3</b> | <b>1.5</b>    |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                   |  |  |  |  |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--|--|--|--|-----------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                   |  |  |  |  |           |
| <ul style="list-style-type: none"> <li>Basic understanding of Physics and Chemistry concepts studied at Higher Secondary level.</li> <li>This laboratory course provides practical exposure to experimental techniques, measurement methods, and scientific analysis in Physics and Chemistry.</li> </ul>                                                                                                                                                                                       |                                                                                   |  |  |  |  |           |
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                   |  |  |  |  |           |
| <ul style="list-style-type: none"> <li>To develop practical skills in conducting Physics and Chemistry experiments.</li> <li>To understand the principles behind scientific instruments and measurements.</li> <li>To enhance analytical and observation skills through laboratory investigations.</li> <li>To familiarize students with experimental procedures and data interpretation.</li> <li>To apply theoretical concepts of Physics and Chemistry in practical applications.</li> </ul> |                                                                                   |  |  |  |  |           |
| <b>Course Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                   |  |  |  |  |           |
| <b>CO1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Perform Physics experiments using standard laboratory instruments and techniques. |  |  |  |  | <b>K3</b> |
| <b>CO2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Analyse experimental results and verify scientific principles in Physics.         |  |  |  |  | <b>K4</b> |
| <b>CO3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Conduct Chemistry experiments related to volumetric and instrumental analysis.    |  |  |  |  | <b>K3</b> |
| <b>CO4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Apply safety measures and good laboratory practices during experiments            |  |  |  |  | <b>K3</b> |
| <b>CO5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Interpret experimental observations and prepare laboratory reports effectively    |  |  |  |  | <b>K4</b> |

|                                       |                                                                                   |
|---------------------------------------|-----------------------------------------------------------------------------------|
| <b>List of Experiments: (Physics)</b> |                                                                                   |
| 1.                                    | Radius of curvature of lens – Newton’s Ring                                       |
| 2.                                    | Determination of particle size of lycopodium powder using semiconductor laser.    |
| 3.                                    | Determination of wavelength of laser light using semiconductor laser diffraction. |
| 4.                                    | Determination of numerical aperture and acceptance angle in an optical fiber.     |
| 5.                                    | Determination of Dispersive power of a prism using Spectrometer.                  |
| 6.                                    | Determination of wavelength of mercury spectrum – spectrometer grating .          |
| 7.                                    | Specific rotatory power – Lorentz’s half shade polarimeter                        |
| 8.                                    | Determination of solar cell characteristics.                                      |

| <b>List of Experiments (Chemistry)</b>                                     |
|----------------------------------------------------------------------------|
| 1. Kinetic study of acid hydrolysis of ethyl acetate                       |
| 2. Total hardness of water - Determination by EDTA method                  |
| 3. Freundlich adsorption isotherm - Adsorption of acetic acid on charcoal  |
| 4. Chloride content of water - Determination by Mohr's method              |
| 5. Determination of oxalic acid by permanganometry                         |
| 6. Determination of ferrous by permanganometry                             |
| 7. Determination of carbonate and bicarbonate in a mixture                 |
| 8. Beer-Lamberts law - Determination of ferrous by colorimetry             |
| 9. Magnesium content in water - Determination by EDTA method               |
| 10. Acetic acid content in vinegar                                         |
| 11. Dissolved oxygen content in water - Determination by Winkler's method. |
| 12. Determination of available chlorine in bleaching powder                |
| 13. Conductometric titration                                               |
| 14. Potentiometric titration                                               |
| 15. Chemical analysis of salt for cations and anions                       |

**Total Hours: 45**

| <b>Text Books</b>                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. C.L. Arora, Practical Physics, S. Chand Publications.<br>2. Vogel's Textbook of Quantitative Chemical Analysis, Pearson Education.<br>3. B.D. Khosla, Senior Practical Physics, R. Chand Publications. |
| <b>Reference</b>                                                                                                                                                                                          |
| 1. V.K. Ahluwalia, Practical Chemistry, University Press.<br>2. S. Chand and Company, Engineering Chemistry Laboratory Manual.<br>3. P. R. Sasi Kumar, Practical Physics Laboratory Manual.               |
| <b>Web/ NPTEL Links</b>                                                                                                                                                                                   |
| 1. <a href="https://www.olabs.edu.in/">https://www.olabs.edu.in/</a><br>2. <a href="https://vlab.amrita.edu/">https://vlab.amrita.edu/</a>                                                                |

| <b>Evaluation Criteria</b>        | <b>Assessment Methodology</b>                                    | <b>Marks</b> |
|-----------------------------------|------------------------------------------------------------------|--------------|
| Observation and Record            | Regular lab Observation and Record writing and timely submission | 20           |
| Model Practical Test              | Internal Practical Test                                          | 15           |
| Continuous Laboratory Performance | Lab Performance, Experiment completion                           | 10           |
| Vivo -Voce                        | Oral question during lab sessions                                | 5            |
| Attendance                        | Based on laboratory attendance percentage                        | 10           |
|                                   | Total                                                            | 60           |

|                 |                             |                 |          |          |          |               |
|-----------------|-----------------------------|-----------------|----------|----------|----------|---------------|
| <b>MEL26203</b> | <b>ENGINEERING GRAPHICS</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                             | ESC             | 0        | 0        | 3        | 1.5           |

### Course Prerequisite / Preamble

- Basic knowledge of plane geometry (Class X / XII level).
- Familiarity with drawing instruments and their usage.
- Understanding of spatial visualization and 3D shapes.
- Engineering Graphics is the universal language of engineering communication. This laboratory course equips students with the fundamental skills to interpret, construct, and communicate engineering information through standard graphical representations. Students are trained in manual drafting techniques, orthographic projections, isometric and perspective views, and the conventions of first-angle and third-angle projections in accordance with BIS standards.

### Course Objective

- To impart proficiency in the use of drawing instruments and BIS conventions for engineering drawing.
- To develop the ability to construct conic sections, engineering curves, and their applications.
- To train students in orthographic projections of points, lines, planes, and solids.
- To develop skills in drawing isometric and perspective views from multi-view orthographic drawings.
- To enable conversion between 2D multi-view drawings and 3D pictorial representations.

### Course Outcome

|     |                                                                                                                                       |    |
|-----|---------------------------------------------------------------------------------------------------------------------------------------|----|
| CO1 | Draw engineering curves such as conic sections, involutes, and cycloids using standard drawing instruments following BIS conventions. | K3 |
| CO2 | Construct orthographic projections of points and lines in various quadrants and determine true lengths and true inclinations.         | K3 |
| CO3 | Generate orthographic projections of planes and regular solids in different positions and inclinations.                               | K3 |
| CO4 | Produce isometric projections and isometric views from given orthographic multi-view drawings.                                        | K3 |
| CO5 | Develop perspective projections and convert given pictorial views to orthographic drawings demonstrating spatial reasoning.           | K3 |

| S.No | Topic                                                                                                                                                          | Hours | CO  |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|
| 1    | Drawing of engineering curves – Ellipse (Concentric circles method and Oblong method), Parabola and Hyperbola                                                  | 6     | CO1 |
| 2    | Drawing of engineering curves – Cycloid, Epicycloid, Hypocycloid, and Involute of a circle and a square                                                        | 6     | CO1 |
| 3    | Projection of points – projection of points in all four quadrants; determination of quadrant from given projections                                            | 3     | CO2 |
| 4    | Projection of straight lines – lines parallel and inclined to both reference planes; determination of true length and true inclination by rotating line method | 6     | CO2 |
| 5    | Projection of planes – projection of triangular, rectangular, pentagonal, and hexagonal planes in various positions                                            | 6     | CO3 |
| 6    | Projection of regular solids (prisms and pyramids) with axis perpendicular and inclined to the reference planes                                                | 6     | CO3 |
| 7    | Projection of regular solids (cylinders and cones) with axis inclined to HP and VP; true shape of sections                                                     | 6     | CO3 |
| 8    | Development of lateral surfaces of prisms, cylinders, pyramids, and cones (including cut solids)                                                               | 6     | CO3 |
| 9    | Isometric projection and isometric view of simple and combination solids; conversion from orthographic multi-view to isometric view                            | 9     | CO4 |
| 10   | Perspective projection of prisms and pyramids using visual ray method; conversion of pictorial views to orthographic projections (Mini-Exercise)               | 6     | CO5 |

**Total Hours: 45**

|                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                    |
| 1. Venugopal, K., <i>Engineering Drawing and Graphics + AutoCAD</i> , New Age International Publishers, New Delhi, 5th Edition, 2020.<br>2. Bhatt, N.D., <i>Engineering Drawing: Plane and Solid Geometry</i> , Charotar Publishing House, 53rd Edition, 2022.<br>3. Gopalakrishna, K.R., <i>Engineering Drawing (Vol. I &amp; II)</i> , Subhas Stores, Bangalore, 2019.             |
| <b>Reference</b>                                                                                                                                                                                                                                                                                                                                                                     |
| 1. French, T.E. and Vierck, C.J., <i>Engineering Drawing and Graphic Technology</i> , McGraw-Hill, New York, 2005.<br>2. 2. Shah, M.B. and Rana, B.C., <i>Engineering Drawing</i> , Pearson Education, New Delhi, 2nd Edition, 2009.<br>3. BIS Standards Publication SP: 46 ( <i>Engineering Drawing Practice for Schools and Colleges</i> ), Bureau of Indian Standards, New Delhi. |

| <b>CO PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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          | -          | -          | 1          | -          | -           | -           | 3           | 2           |
| CO2                  | 3          | 2          | 2          | -          | 1          | -          | -          | 1          | -          | -           | -           | 3           | 2           |
| CO3                  | 3          | 3          | 2          | -          | 1          | -          | -          | 1          | -          | -           | -           | 3           | 2           |
| CO4                  | 3          | 3          | 2          | -          | 2          | -          | -          | 1          | -          | -           | -           | 3           | 3           |
| CO5                  | 3          | 3          | 3          | -          | 2          | -          | -          | 1          | -          | -           | -           | 3           | 3           |

| <b>Evaluation Criteria</b>        | <b>Assessment Methodology</b>                                    | <b>Marks</b> |
|-----------------------------------|------------------------------------------------------------------|--------------|
| Observation and Record            | Regular lab Observation and Record writing and timely submission | 20           |
| Model Practical Test              | Internal Practical Test                                          | 15           |
| Continuous Laboratory Performance | Lab Performance, Experiment completion                           | 10           |
| Vivo -Voce                        | Oral question during lab sessions                                | 5            |
| Attendance                        | Based on laboratory attendance percentage                        | 10           |
|                                   | Total                                                            | 60           |

|                 |                                                              |                 |          |          |               |
|-----------------|--------------------------------------------------------------|-----------------|----------|----------|---------------|
| <b>CDC26201</b> | <b>CAREER DEVELOPMENT<br/>SKILL – II( C<br/>PROGRAMMING)</b> | <b>CATEGORY</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                                              | CDS             | 0        | 2        | 1             |

### Course Prerequisite / Preamble

- Basic knowledge of mathematical logic and algorithmic thinking.
- No prior programming experience is required.

### Course Objective

The course aims to enable students to:

- Formulate computational logic using visual and structural tools like algorithms, flowcharts, and pseudocode for real-world mathematical problems.
- Master structural control flows by employing conditional statements, looping constructs, and nested logical branching to handle complex decision-making.
- Deconstruct complex problems into modular, reusable components using multi-dimensional arrays, matrix mathematics, and recursive structural functions.
- Manipulate direct memory and custom abstract data objects using pointers, memory addresses, structures, and unions.
- Architect persistent software applications capable of performing file management operations (CRUD) alongside advanced preprocessor configurations.

### Course Outcome

|            |                                                                                                                                                        |    |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>CO1</b> | Design systematic algorithms, flowcharts, and basic structural C programs utilizing formatted I/O operations and foundational tokens.                  | K3 |
| <b>CO2</b> | Implement and evaluate structural control loops and decision-making logic to solve computational mathematics and sequential array manipulation.        | K4 |
| <b>CO3</b> | Develop modular, scalable software programs by constructing user-defined functions, recursive algorithms, and complex matrix/string handling routines. | K3 |
| <b>CO4</b> | Utilize pointers and customized data architectures (Structures and Unions) to handle efficient memory mapping and data aggregation.                    | K3 |
| <b>CO5</b> | Build persistent data systems using sequential and random file access methods alongside preprocessor directives and command-line interfaces.           | K5 |

| Syllabus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------|
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Problem Solving and C Fundamentals</b> | <b>(6)</b> |
| <p><b>THEORY:</b> Problem solving techniques – Program development cycle – Algorithm – Flowchart – Pseudocode – Introduction to C – Structure of a C program – C tokens – Keywords and identifiers – Variables and constants – Basic data types – Input and output functions</p> <p><b>LAB:</b></p> <ol style="list-style-type: none"> <li>1. Develop algorithms, flowcharts and pseudocode for simple computational problems. Implement programs for simple interest, area calculation and temperature conversion.</li> <li>2. Write C programs for student mark calculation, total, average, percentage and grade calculation using formatted I/O.</li> </ol> <p>Develop programs using if, if-else, nested-if and switch – largest of three numbers, leap year and menu-driven calculator.</p>                                                   |                                           |            |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Trees and Balanced Trees</b>           | <b>(6)</b> |
| <p><b>THEORY:</b><br/>Arithmetic, relational and logical operators – Expressions – Type conversion – Formatted I/O – if, if-else, nested-if, switch – for, while, do-while – break and continue – Applications of decision making and looping</p> <p><b>LAB:</b></p> <ol style="list-style-type: none"> <li>1. Develop programs using loops – factorial, Fibonacci, prime numbers, palindrome, Armstrong and perfect numbers.</li> <li>2. Implement one-dimensional array operations – maximum, minimum, second largest, reverse, sum and average.</li> </ol> <p>Implement linear search, binary search and sorting algorithms using arrays.</p>                                                                                                                                                                                                    |                                           |            |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Arrays, Functions and Strings</b>      | <b>(6)</b> |
| <p><b>THEORY:</b><br/>One-dimensional arrays – Array operations – Searching – Sorting – Two-dimensional arrays – Matrix operations – Functions – Function arguments and return values – Passing arrays to functions – Recursion – Basic storage classes – Strings – String library functions</p> <p><b>LAB:</b></p> <ol style="list-style-type: none"> <li>1. Implement matrix operations – addition, subtraction, multiplication, transpose, diagonal sum and symmetric matrix.</li> <li>2. Develop programs using functions, passing arrays to functions and recursion – factorial, GCD, Fibonacci and Tower of Hanoi.</li> <li>3. Implement string operations using library functions and user-defined functions – length, copy, compare, concatenate, reverse and palindrome. Performance comparison of hashing methods.</li> <li>4.</li> </ol> |                                           |            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                        |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------|
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Structures, Unions and Pointers</b> | <b>(6)</b> |
| <b>THEORY:</b><br>Structures – Array of structures – Nested structures – Passing structures to functions – typedef – Union – Difference between structure and union – Pointers – Pointer operators – Pointers with arrays, functions, strings and structures<br><b>LAB:</b> <ol style="list-style-type: none"> <li>1. Develop a Student Information System using structures and arrays of structures.</li> <li>2. Implement nested structures, typedef and union and demonstrate the difference between structure and union.</li> <li>3. Develop programs using pointers with arrays and functions – swapping, array processing and call by address.</li> </ol>                   |                                        |            |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>File Handling and C</b>             | <b>(6)</b> |
| <b>THEORY:</b><br>Files and file modes – Opening and closing files – Reading, writing and appending – Sequential file access – Random file access – fseek(), ftell(), rewind() – Command-line arguments – Preprocessor directives – Macros – Header files – Conditional compilation<br><b>LAB:</b> <ol style="list-style-type: none"> <li>1. Develop programs using pointers with strings and structures.</li> <li>2. Develop a File-Based Student Record Management System – create, read, write, append, search and update records.</li> <li>3. Implement random file access, command-line arguments, macros, user-defined header files and conditional compilation.</li> </ol> |                                        |            |

**Total Hours: 30**

|                                                                                          |
|------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                       |
| 1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, Sixth edition, 2012.      |
| <b>Reference:</b>                                                                        |
| 2. Vikas Verma, “A Workbook on C “, Cengage Learning, Second Edition, 2012               |
| 3. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2008. |

**Web / NPTEL Resources:**

1. [https://nptel.ac.in/courses/106104128?utm\\_source](https://nptel.ac.in/courses/106104128?utm_source)
2. [https://onlinecourses-archive.nptel.ac.in/noc17\\_cs43/preview](https://onlinecourses-archive.nptel.ac.in/noc17_cs43/preview)

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 2   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0    | 0    | 2    |
| CO2 | 3   | 3   | 2   | 1   | 2   | 0   | 0   | 0   | 0   | 0    | 0    | 2    |
| CO3 | 3   | 3   | 2   | 2   | 2   | 0   | 0   | 0   | 0   | 0    | 0    | 2    |
| CO4 | 3   | 3   | 3   | 3   | 2   | 0   | 0   | 0   | 1   | 0    | 0    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 0   | 0   | 1   | 2   | 1    | 0    | 3    |

**Assessment Methodology**

| Assessment Methodology             | Assessment Tools                      | Marks |
|------------------------------------|---------------------------------------|-------|
| Continuous Internal Assessment     | Observation / Record Work / Viva Voce | 30    |
| Internal Practical Examination     | Laboratory Performance                | 30    |
| End Semester Practical Examination | Experiment and Viva Voce              | 40    |
| Total                              |                                       | 100   |

|          |                                                   |          |   |   |   |        |
|----------|---------------------------------------------------|----------|---|---|---|--------|
| NSC26202 | NATIONAL SOCIAL SERVICE /<br>VILLAGE CAMP / RALLY | CATEGORY | L | T | P | CREDIT |
|          |                                                   | AEC      | 0 | 0 | 1 | -      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <ul style="list-style-type: none"> <li>This course provides students with opportunities to participate in community service activities, rural development programs, social awareness campaigns, village camps, and public welfare initiatives.</li> <li>The course aims to develop social responsibility, leadership qualities, teamwork, communication skills, and awareness about societal issues through active participation in extension and outreach activities.</li> </ul>                      |
| <b>Course Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>To promote social responsibility and community service among students.</li> <li>To create awareness about rural development, environmental protection, and social welfare activities.</li> <li>To develop leadership qualities, teamwork, and communication skills.</li> <li>To encourage active participation in village camps, rallies, and social awareness programs.</li> <li>To inculcate ethical values, discipline, and national integration.</li> </ul> |

| CO  | COURSE OUTCOME                                                                                          | K LEVEL |
|-----|---------------------------------------------------------------------------------------------------------|---------|
| CO1 | Understand the importance of community service and social responsibility.                               | (K2)    |
| CO2 | Participate actively in village camps, rallies, and social awareness programs.                          | (K3)    |
| CO3 | Develop leadership, teamwork, and interpersonal communication skills.                                   | (K3)    |
| CO4 | Apply ethical values and social commitment in community development activities.                         | (K3)    |
| CO5 | Demonstrate discipline, environmental awareness, and national integration through extension activities. | (K4)    |

|                                                                                                       |
|-------------------------------------------------------------------------------------------------------|
| <b>SYLLABUS</b>                                                                                       |
| <b>LIST OF ACTIVITIES</b>                                                                             |
| 1. Orientation programme on National Social Service, social responsibility, and community engagement. |
| 2. Campus cleanliness and environmental awareness activities.                                         |
| 3. Tree plantation and green campus initiatives.                                                      |
| 4. Participation in village survey and rural development activities.                                  |
| 5. Health awareness rally and community interaction programme.                                        |
| 6. Awareness programmes on hygiene, sanitation, and public health.                                    |
| 7. Blood donation awareness / road safety / anti-drug awareness rally.                                |

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| 8. Village camp activities including teamwork, leadership, and social service.                    |
| 9. Participation in national festivals, social campaigns, and public welfare programmes.          |
| 10. Preparation of activity report, reflection, and presentation of community service activities. |

|                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reference</b>                                                                                                                                                                                                                                                                                                                                                               |
| <ol style="list-style-type: none"> <li>1. National Service Scheme Manual, Government of India.</li> <li>2. Youth Red Cross and Community Service Handbooks.</li> <li>3. Environmental and Rural Development Awareness Materials.</li> <li>4. Swachh Bharat Mission and Social Welfare Programme Guidelines.</li> </ol>                                                         |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                                                                                   |
| <ol style="list-style-type: none"> <li>1. <a href="https://nss.gov.in/">https://nss.gov.in/</a></li> <li>2. <a href="https://www.india.gov.in/">https://www.india.gov.in/</a></li> <li>3. <a href="https://www.mygov.in/">https://www.mygov.in/</a></li> <li>4. <a href="https://www.un.org/sustainabledevelopment/">https://www.un.org/sustainabledevelopment/</a></li> </ol> |

| <b>CO-PO Mapping</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <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>           | 1          | 1          | -          | -          | -          | 3          | 3          | 3          | 1          | 1           | 1           | 1           | 1           |
| <b>CO2</b>           | 1          | 1          | -          | -          | -          | 3          | 3          | 3          | 2          | 2           | 1           | 1           | 1           |
| <b>CO3</b>           | 1          | 1          | -          | -          | -          | 2          | 2          | 2          | 3          | 3           | 1           | 1           | 1           |
| <b>CO4</b>           | 1          | 1          | -          | -          | -          | 3          | 3          | 3          | 2          | 2           | 1           | 1           | 1           |
| <b>CO5</b>           | 1          | 1          | -          | -          | -          | 3          | 3          | 3          | 2          | 2           | 1           | 1           | 1           |

| <b>Assessment Methodology</b>   |                                                     |              |
|---------------------------------|-----------------------------------------------------|--------------|
| <b>Assessment Methodology</b>   | <b>Assessment Tools</b>                             | <b>Marks</b> |
| Participation and Involvement   | Community Service Activities / Village Camp / Rally | 40           |
| Activity Record and Report      | Field Diary / Documentation / Reflection Report     | 30           |
| Presentation and Teamwork Group | Participation and Communication Skills              | 20           |
| Discipline and Attendance       | Regularity and Conduct                              | 10           |
| Total                           |                                                     | 100          |

