

# 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 – 605110**



**Curriculum and Syllabus**

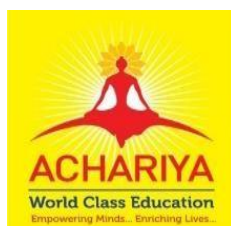
**for**

**B. Tech. (Electronics and Communication Engineering)**

**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 ELECTRONICS AND COMMUNICATION ENGINEERING**  
**ACHARIYA COLLEGE OF ENGINEERING TECHNOLOGY**

**ACET Electronics and Communication Engineering 2026-2027 Regulation**

## **VISION AND MISSION OF THE COLLEGE**

### **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**

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

## **DEPARTMENT VISION & MISSION**

### **VISION:**

To provide quality education in Electronics and Communication Engineering that helps students become skilled engineers, responsible citizens and lifelong learners who can make a difference in society and the world.

### **MISSION:**

- To offer strong fundamentals and practical knowledge in Electronics and Communication Engineering.
- To promote creativity and innovation through student and faculty research activities.
- To build strong tie-up with industries to improve real-world learning and job opportunities.
- To support the holistic development of students with values, ethics, and leadership skills.
- To encourage students to use their knowledge to solve real-life problems and serve society.

## **CURRICULUM AND SYLLABUS**

The Curriculum of B.Tech. (Electronics and Communication Engineering) is designed to fulfil the Program Educational Objectives (PEO) and the Program Outcomes (PO) listed below.

### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

|             |                                                                                                                                                                                                                        |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PEO1</b> | Graduates will apply their knowledge and skills in electronics and communication engineering to pursue successful career, higher education and professional development in industry and research.                      |
| <b>PEO2</b> | Graduates will demonstrate innovation, creativity, problem-solving and lifelong learning to address emerging challenges and contribute to contemporary areas in electronics and communication engineering.             |
| <b>PEO3</b> | Graduates will exhibit professional ethics, effective communication, teamwork, leadership and social responsibility while addressing real-world engineering challenges for the benefit of society and the environment. |

### **PROGRAM OUTCOMES (POs)**

|            |                                                   |                                                                                                                                                                                                                                                                                      |
|------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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 of complex Problems</b> | Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, 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 (PSOs)**

|             |                                                                                                                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PSO1</b> | Graduates will be able to apply, design, implement and analyze innovative systems in areas such as electronics, communication systems, signal processing, VLSI, embedded systems and emerging technologies.                             |
| <b>PSO2</b> | Graduates will be able to analyze complex problems and apply appropriate analytical, computational, hardware and software tools to develop efficient, innovative, sustainable and cost-effective solutions for real-world applications. |

### **SUSTAINABLE DEVELOPMENT GOALS (SDGs)**

|              |                    |                                                                                                                                    |
|--------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <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                                       |

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|              |                                                 |                                                                                                                      |
|--------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <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                 | <b>1 Credit</b>   |
| 1 Hour Tutorial (T) per week per semester                | <b>1 Credit</b>   |
| 2 Hours Practical / Laboratory (P) per week per semester | <b>1 Credit</b>   |

**SCHEME OF CREDIT DISTRIBUTION-SUMMARY**

|                                                   | I           | II          | III         | IV        | V         | VI          | VII       | VIII      | Total      |
|---------------------------------------------------|-------------|-------------|-------------|-----------|-----------|-------------|-----------|-----------|------------|
| <b>Basic Science Courses</b>                      | 8.5         | 07          | 04          | 04        | -         | -           | -         | -         | 23.5       |
| <b>Engineering Science Courses</b>                | 09          | 7.5         | -           | -         | -         | -           | -         | -         | 16.5       |
| <b>Professional Core Courses</b>                  | -           | 4           | 17.5        | 16        | 20        | 12          | -         | -         | 69.5       |
| <b>Professional Elective Courses</b>              | -           | -           | -           | -         | -         | 06          | 06        | -         | 12         |
| <b>Humanities, Social Sciences and Management</b> | 3           | 3           | -           | -         | 3         | 1.5         | 3         | -         | 13.5       |
| <b>Open Elective Courses</b>                      | -           | -           | -           | -         | -         | 3           | 6         | -         | 9          |
| <b>Project / Internship / Hackathon</b>           | -           | -           | -           | -         | 1         | 2           | 5         | 6         | 14         |
| <b>Mandatory Courses</b>                          | -           | -           | -           | -         | -         | -           | -         | -         | -          |
| <b>Career Development Skill</b>                   | 1           | 1           | 1           | 1         | 1         | 1           | -         | -         | 6          |
| <b>Skill Development Laboratory</b>               | -           | -           | -           | 1         | 1         | 1           | 1         | -         | 4          |
| <b>TOTAL</b>                                      | <b>21.5</b> | <b>22.5</b> | <b>22.5</b> | <b>22</b> | <b>26</b> | <b>26.5</b> | <b>21</b> | <b>06</b> | <b>168</b> |

**STRUCTURE OF THE UG PROGRAMME (Total: 168 Credits)**

| Sl. No. | CODE | CATEGORY                                   | SUGGESTED CREDITS | CREDIT POINTS (168) |
|---------|------|--------------------------------------------|-------------------|---------------------|
| 1       | BSC  | Basic Science Courses                      | <b>23*</b>        | 23.5                |
| 2       | ESC  | Engineering Science Courses                | <b>17*</b>        | 16.5                |
| 3       | PCC  | Professional Core Courses                  | <b>61*</b>        | 69.5                |
| 4       | PEL  | Professional Elective Courses              | <b>12*</b>        | 12                  |
| 5       | HSM  | Humanities, Social Sciences and Management | <b>15*</b>        | 13.5                |
| 6       | OEL  | Open Elective Courses                      | <b>12*</b>        | 9                   |
| 7       | PROJ | Project / Internship / Seminar             | <b>20*</b>        | 14                  |
| 8       | SDL  | Skill Development Laboratory               | <b>04*</b>        | 4                   |
| 9       | MAN  | Mandatory Courses                          | Non Credit        | -                   |
| 10      | CDS  | Career Development Skill                   | <b>06*</b>        | 6                   |
|         |      | <b>Total Credits</b>                       | <b>160</b>        | 168                 |

### **LIST OF ABBREVIATIONS**

| <b>S.NO</b> | <b>ABBREVIATION</b> | <b>FULL FORM</b>                           |
|-------------|---------------------|--------------------------------------------|
| 1           | BSC                 | Basic Science Courses                      |
| 2           | ESC                 | Engineering Science Courses                |
| 3           | HSM                 | Humanities, Social Sciences and 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 and 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 and Chemistry                      |
| 24          | NS                  | National Social Service                    |
| 25          | MN                  | Mandatory                                  |
| 26          | NIH                 | NPTEL / Internship / Hackathon             |
| 27          | YOC                 | Yoga                                       |

## **LIST OF PROGRAMMES 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      |
| ENC26102     | Technical English and Communication                     | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | HSM      |
| EEC26103     | Basic Electrical and Electronics Engineering            | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | ESC      |
| PCT26104     | Physics and Chemistry for Electronics Engineers         | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | BSC      |
| MET26105     | Basic Civil and Mechanical Engineering                  | 3         | 0        | 0         | 3         | 1         | 3           | 40       | 60       | 100      | ESC      |
| EEL26101     | Basic Electrical and Electronics Engineering Laboratory | 0         | 0        | 3         | 3         | 1         | 1.5         | 60       | 40       | 100      | ESC      |
| PCL26102     | Physics & Chemistry Laboratory                          | 0         | 0        | 3         | 3         | 1         | 1.5         | 60       | 40       | 100      | BSC      |
| MEL26103     | Engineering Drawing 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 Sports Activities/PET            | 0         | 0        | 1         | 1         | -         | 0           | -        | -        | -        | AEC      |
| <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> |

## **II SEMESTER**

| <b>Course Code</b> | <b>Course Title</b>                            | <b>L</b>  | <b>T</b> | <b>P</b>  | <b>Hrs/Wk</b> | <b>SL</b> | <b>C</b>    | <b>CIA</b> | <b>ESE</b> | <b>Total</b> | <b>Category</b> |
|--------------------|------------------------------------------------|-----------|----------|-----------|---------------|-----------|-------------|------------|------------|--------------|-----------------|
| MAC26201           | Partial Differential Equations and Transforms  | 3         | 1        | 0         | 4             | 2         | <b>4</b>    | 40         | 60         | 100          | BSC             |
| UHC26202           | Universal Human Values                         | 3         | 0        | 0         | 3             | 1         | <b>3</b>    | 40         | 60         | 100          | HSM             |
| PPC26203           | Problem Solving and Python Program             | 3         | 0        | 0         | 3             | 1         | <b>3</b>    | 40         | 60         | 100          | ESC             |
| BET26204           | Biology for Electronics Engineers              | 3         | 0        | 0         | 3             | 1         | <b>3</b>    | 40         | 60         | 100          | BSC             |
| ECT26205           | Circuit Analysis                               | 3         | 1        | 0         | 4             | 1         | <b>4</b>    | 40         | 60         | 100          | PCC             |
| PPL26201           | Python Programming Laboratory                  | 0         | 0        | 3         | 3             | 1         | <b>1.5</b>  | 60         | 40         | 100          | ESC             |
| EWL26202           | Engineering Workshop Laboratory                | 0         | 0        | 3         | 3             | 1         | <b>1.5</b>  | 60         | 40         | 100          | ESC             |
| TTL26203           | Design Thinking and Idea Laboratory            | 0         | 0        | 3         | 3             | 1         | <b>1.5</b>  | 60         | 40         | 100          | ESC             |
| CDC26201           | Career Development Skill – II                  | 0         | 0        | 2         | 2             | 1         | <b>1</b>    | 100        | -          | 100          | CDS             |
| NSC26201           | National Social Service / Village Camp / Rally | 0         | 0        | 1         | 1             | -         | <b>0</b>    | -          | -          | -            | AEC             |
| <b>TOTAL</b>       |                                                | <b>15</b> | <b>2</b> | <b>12</b> | <b>29</b>     | <b>10</b> | <b>22.5</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 |
|--------------|--------------------------------------------|-----------|----------|-----------|------------|-----------|-------------|----------|----------|----------|----------|
| MAT26301     | Probability and Statistics                 | 3         | 1        | 0         | 4          | 2         | 4           | 40       | 60       | 100      | BSC      |
| ECT26302     | Electronic Devices and Circuits            | 3         | 0        | 0         | 3          | 1         | 3           | 40       | 60       | 100      | PCC      |
| ECT26303     | Digital Logic System Design                | 3         | 0        | 0         | 3          | 1         | 3           | 40       | 60       | 100      | PCC      |
| ECT26304     | Signals and Systems                        | 3         | 1        | 0         | 4          | 2         | 4           | 40       | 60       | 100      | PCC      |
| ECT26305     | Analog Communication Systems               | 3         | 0        | 0         | 3          | 1         | 3           | 40       | 60       | 100      | PCC      |
| MNC26306     | Environmental Science                      | 1         | 0        | 0         | 1          | 1         | -           | -        | -        | -        | MAN      |
| ECL26301     | Electronic Devices and Circuits Laboratory | 0         | 0        | 3         | 3          | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| ECL26302     | Digital Logic System Design Laboratory     | 0         | 0        | 3         | 3          | 1         | 1.5         | 60       | 40       | 100      | PCC      |
| ECL26303     | Analog Communication Systems 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 and Training            | 0         | 0        | 1         | 1          | -         | -           | 100      | -        | 100      | AEC      |
| <b>TOTAL</b> |                                            | <b>16</b> | <b>2</b> | <b>12</b> | <b>30</b>  | <b>12</b> | <b>22.5</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

**IV SEMESTER**

| Course Code  | Course Title                          | L         | T        | P         | Hrs/<br>W | SL        | C         | CIA      | ESE      | Total    | Category |
|--------------|---------------------------------------|-----------|----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| MAT26401     | Numerical Methods and Wave Equations  | 3         | 1        | 0         | 4         | 2         | 4         | 40       | 60       | 100      | BSC      |
| ECT26402     | Linear Integrated Circuits            | 2         | 0        | 2         | 4         | 2         | 3         | 40       | 60       | 100      | PCC      |
| ECT26403     | Electromagnetic Waves                 | 3         | 1        | 0         | 4         | 2         | 4         | 40       | 60       | 100      | PCC      |
| ECT26404     | Digital Communication                 | 3         | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | PCC      |
| ECT26405     | Microcontrollers and its Applications | 3         | 0        | 0         | 3         | 1         | 3         | 40       | 60       | 100      | PCC      |
| MNC26406     | Indian Constitution                   | 1         | 0        | 0         | 1         | -         | -         | -        | -        | -        | MAN      |
| ECL26401     | Digital Communication Laboratory      | 0         | 0        | 3         | 3         | 1         | 1.5       | 60       | 40       | 100      | PCC      |
| ECL26402     | Microcontrollers Laboratory           | 0         | 0        | 3         | 3         | 1         | 1.5       | 60       | 40       | 100      | PCC      |
| NIH26001     | NPTEL / Internship / Hackathon        | 0         | 0        | 1         | 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         | -         | -         | -        | -        | -        | AEC      |
| <b>TOTAL</b> |                                       | <b>15</b> | <b>2</b> | <b>12</b> | <b>29</b> | <b>12</b> | <b>22</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

**V SEMESTER**

| Course Code  | Course Title                                 | L         | T        | P         | Hrs/<br>Wk | SL        | C         | CIA      | ESE      | Total    | Category |
|--------------|----------------------------------------------|-----------|----------|-----------|------------|-----------|-----------|----------|----------|----------|----------|
| ECT26501     | Digital Signal Processing                    | 3         | 1        | 0         | 4          | 2         | 4         | 40       | 60       | 100      | PCC      |
| ECT26502     | Control Systems                              | 3         | 1        | 0         | 4          | 2         | 4         | 40       | 60       | 100      | PCC      |
| ECT26503     | Internet of Things and its Applications      | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | PCC      |
| ECT26504     | Artificial Intelligence and Machine Learning | 2         | 0        | 2         | 4          | 2         | 3         | 40       | 60       | 100      | PCC      |
| ECT26505     | Antenna and Wave Propagation                 | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | PCC      |
| TMT26501     | Total Quality Management                     | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | HSM      |
| ECL26501     | Digital Signal Processing Laboratory         | 0         | 0        | 3         | 3          | 1         | 1.5       | 60       | 40       | 100      | PCC      |
| ECL26502     | Internet of Things Laboratory                | 0         | 0        | 3         | 3          | 1         | 1.5       | 60       | 40       | 100      | PCC      |
| ECP26501     | Micro Project                                | 0         | 0        | 2         | 2          | 5         | 1         | 100      | -        | 100      | PROJ     |
| NIH26002     | NPTEL/Internship/Hackathon                   | 0         | 0        | 2         | 2          | 1         | 1         | 100      | -        | 100      | SDL      |
| CDC26501     | Career Development Skill – V                 | 0         | 0        | 2         | 2          | 1         | 1         | 100      | -        | 100      | CDS      |
| <b>TOTAL</b> |                                              | <b>17</b> | <b>2</b> | <b>14</b> | <b>33</b>  | <b>18</b> | <b>26</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

**VI SEMESTER**

| <b>Course Code</b> | <b>Course Title</b>             | <b>L</b>  | <b>T</b> | <b>P</b>  | <b>Hrs/<br/>Wk</b> | <b>SL</b> | <b>C</b>    | <b>CIA</b> | <b>ESE</b> | <b>Total</b> | <b>Category</b> |
|--------------------|---------------------------------|-----------|----------|-----------|--------------------|-----------|-------------|------------|------------|--------------|-----------------|
| ECT26601           | Computer Networks               | 3         | 0        | 0         | 3                  | 1         | 3           | 40         | 60         | 100          | PCC             |
| ECT26602           | VLSI Design                     | 3         | 0        | 0         | 3                  | 1         | 3           | 40         | 60         | 100          | PCC             |
| ECT26603           | Wireless Communication          | 3         | 0        | 0         | 3                  | 1         | 3           | 40         | 60         | 100          | PCC             |
| ECPE26XX           | Professional Elective – I       | 3         | 0        | 0         | 3                  | 1         | 3           | 40         | 60         | 100          | PEL             |
| ECPE26XX           | Professional Elective – II      | 3         | 0        | 0         | 3                  | 1         | 3           | 40         | 60         | 100          | PEL             |
| ECOE26XX           | Open Elective – I               | 3         | 0        | 0         | 3                  | -         | 3           | 40         | 60         | 100          | OEL             |
| ECL26601           | Computer Networks Laboratory    | 0         | 0        | 3         | 3                  | 1         | 1.5         | 60         | 40         | 100          | PCC             |
| ECL26602           | VLSI Design Laboratory          | 0         | 0        | 3         | 3                  | 1         | 1.5         | 60         | 40         | 100          | PCC             |
| ENL26601           | Communication Skills Laboratory | 0         | 0        | 3         | 3                  | 1         | 1.5         | 60         | 40         | 100          | HSM             |
| ECP26601           | Mini Project                    | 0         | 0        | 4         | 4                  | 5         | 2           | 50         | 50         | 100          | PROJ            |
| NIH26003           | NPTEL / Internship/ Hackathon   | 0         | 0        | 2         | 2                  | 1         | 1           | 100        | -          | 100          | SDL             |
| CDC26601           | Career Development Skill –VI    | 0         | 0        | 2         | 2                  | 1         | 1           | 100        | -          | 100          | CDS             |
| <b>TOTAL</b>       |                                 | <b>18</b> | <b>0</b> | <b>17</b> | <b>33</b>          | <b>15</b> | <b>26.5</b> | <b>-</b>   | <b>-</b>   | <b>-</b>     | <b>-</b>        |

**VII SEMESTER**

| Course Code  | Course Title                   | L         | T        | P         | Hrs/<br>Wk | SL        | C         | CIA      | ESE      | Total    | Category |
|--------------|--------------------------------|-----------|----------|-----------|------------|-----------|-----------|----------|----------|----------|----------|
| EDT26701     | Entrepreneurship Development   | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | HSM      |
| ECPE26XX     | Professional Elective – III    | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | PEL      |
| ECPE26XX     | Professional Elective – IV     | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | PEL      |
| ECOE26XX     | Open Elective – II             | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | OEL      |
| ECOE26XX     | Open Elective – III            | 3         | 0        | 0         | 3          | 1         | 3         | 40       | 60       | 100      | OEL      |
| ECP26701     | Major Project –Phase I         | 0         | 0        | 10        | 5          | 6         | 5         | 50       | 50       | 100      | PROJ     |
| NIH26004     | NPTEL/Internship/<br>Hackathon | 0         | 0        | 1         | 1          | 1         | 1         | 100      | -        | 100      | SDL      |
| <b>TOTAL</b> |                                | <b>15</b> | <b>0</b> | <b>11</b> | <b>21</b>  | <b>12</b> | <b>21</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

**VIII SEMESTER**

| Course code  | Course Title            | L        | T        | P         | Hrs/<br>Wk | SL        | C        | CIA      | ESE      | Total    | Category |
|--------------|-------------------------|----------|----------|-----------|------------|-----------|----------|----------|----------|----------|----------|
| ECP26801     | Major Project –Phase II | 0        | 0        | 12        | 12         | 10        | 6        | 50       | 50       | 100      | PROJ     |
| <b>TOTAL</b> |                         | <b>0</b> | <b>0</b> | <b>12</b> | <b>12</b>  | <b>10</b> | <b>6</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>-</b> |

# **SEMESTER - I**

|          |                       |          |   |   |   |        |
|----------|-----------------------|----------|---|---|---|--------|
| MAC26101 | Matrices and Calculus | CATEGORY | L | T | P | CREDIT |
|          |                       | BSC      | 3 | 1 | 0 | 4      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ul style="list-style-type: none"> <li>Basic knowledge of algebra, trigonometry, and calculus.</li> <li>Understanding of matrices and elementary differential equations.</li> <li>Foundation for advanced engineering mathematics and applications.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Course Objectives</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>To introduce the concepts of Eigen values, Eigen vectors, matrix transformations, and quadratic forms.</li> <li>To develop problem-solving skills in multivariable differential calculus and optimization techniques.</li> <li>To provide knowledge of double and triple integrals and their applications in area and volume calculations.</li> <li>To familiarize students with vector calculus operations and integral theorems used in engineering applications.</li> <li>To enable students to solve higher order and simultaneous differential equations arising in scientific and engineering problems.</li> </ul> |

| CO  | COURSE OUTCOMES                                                                                                                           | K LEVEL |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 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. |                               |             |

#### Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2019.
2. S. S. Sastry, Engineering Mathematics, Volume I, Prentice Hall of India, 4th Edition, 2014.
3. N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications, 9th Edition, 2018.
4. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India, 10th Edition, 2019.
5. T. Veerarajan, Engineering Mathematics I & II, Tata McGraw-Hill, New Delhi, 2014 & 2015.

#### References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, 3rd Edition, 2016.
2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11th Edition, 2010.
3. H. K. Dass, Engineering Mathematics, S. Chand Publications, Edition/year varies by volume; a commonly catalogued edition is 2010.
4. Singaravelu, Engineering Mathematics I, Meenakshi Agency, 1st Edition, 1995.

#### Web / NPTEL Resources:

1. <https://nptel.ac.in/courses/111105121>
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

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

| <b>Assessment Methodology</b> |                                            |              |
|-------------------------------|--------------------------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b>                    | <b>Marks</b> |
| CAT I                         | Written Examination                        | 30           |
| CAT II                        |                                            |              |
| CAT III                       |                                            |              |
| Continuous Assessment         | Assignment / Activities                    | 5            |
| Attendance                    | Based on course wise attendance percentage | 5            |
| <b>Total</b>                  |                                            | <b>40</b>    |

|          |                                     |          |   |   |   |        |
|----------|-------------------------------------|----------|---|---|---|--------|
| ENC26102 | TECHNICAL ENGLISH AND COMMUNICATION | CATEGORY | L | T | P | CREDIT |
|          |                                     | HSM      | 3 | 0 | 0 | 3      |

#### Course Prerequisite / Preamble

- Enhances communication skills for academic and professional environments.
- Develops LSRW skills for engineering students.
- Focuses on technical, interpersonal, and employability communication skills.

#### Course Objectives

- To develop effective LSRW skills for academic and professional communication.
- To enhance technical and workplace communication skills.
- To improve employability and professional communication practices.
- To improve oral communication, presentation, public speaking, and interview skills for professional and technical environments
- To strengthen workplace communication, grammar, teamwork, ethics, cross-cultural communication, and employability skills using modern communication tools.

| CO  | COURSE OUTCOMES                                                                          | K LEVEL |
|-----|------------------------------------------------------------------------------------------|---------|
| CO1 | Apply effective communication principles in academic and professional contexts           | K3      |
| CO2 | Demonstrate reading comprehension and analytical skills using technical materials        | K3      |
| CO3 | Prepare structured technical and professional documents                                  | K4      |
| CO4 | Demonstrate oral communication skills through presentations, discussions, and interviews | K3      |
| CO5 | Use grammar, vocabulary, and workplace communication effectively in engineering Contexts | K3      |

| Syllabus                                                                                                                                                                                                                                                                                                                                            |                                         |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----|
| UNIT 1                                                                                                                                                                                                                                                                                                                                              | FUNDAMENTALS OF TECHNICAL COMMUNICATION | (9) |
| Introduction to Communication – Process of Communication – Verbal and Non-verbal Communication – Barriers to Communication – Principles of Effective Communication – Seven C's of Communication – Technical Communication in Engineering – Formal and Informal Communication – Digital Communication Etiquette – Listening Skills – Reading Skills. |                                         |     |
| UNIT 2                                                                                                                                                                                                                                                                                                                                              | READING AND LANGUAGE DEVELOPMENT        | (9) |
| 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.                                 |                                         |     |
| UNIT 3                                                                                                                                                                                                                                                                                                                                              | PROFESSIONAL WRITING SKILLS             | (9) |
| Sentence Structures – Paragraph Development – Coherence and Cohesion – Technical Description – Process Writing – Email Writing – Business Letters – Memorandum – Meeting Minutes – Resume Writing – Report                                                                                                                                          |                                         |     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------|
| <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.                                                                                                                                                                                                                                                                                                                                                         |                                                         |            |
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |            |
| <ol style="list-style-type: none"> <li>1. Technical Communication: English Skills for Engineers Meenakshi Raman &amp; Sangeeta Sharma, Oxford University Press, New Delhi, 2nd Edition, 2009.</li> <li>2. Effective Technical Communication, M. Ashraf Rizvi, McGraw Hill Education, New Delhi, 2nd Edition, 2017.</li> <li>3. Business Communication Today, Courtland L. Bovee &amp; John V. Thill, Pearson Education, 14th Edition, 2018.</li> <li>4. Communicative English for Engineers and Professionals, Nitin Bhatnagar &amp; Mamta Bhatnagar, Pearson Longman, 2009.</li> <li>5. English for Engineers and Technologists, Orient Black Swan Publications, Hyderabad, 2010.</li> </ol> |                                                         |            |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |            |
| <ol style="list-style-type: none"> <li>1. Practical English Usage, Michael Swan, Oxford University Press, 4th Edition, 2016.</li> <li>2. Advanced Grammar in Use, Martin Hewings, Cambridge University Press, 3rd Edition, 2013.</li> <li>3. The Elements of Style, William Strunk Jr. &amp; E.B. White, Pearson Education, 4th Edition, 2000.</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/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://www.coursera.org/learn/communication-skills">https://www.coursera.org/learn/communication-skills</a></li> </ol>                                                                                                                                                                                                |                                                         |            |
| Writing – Essay Writing – Instructions and Recommendations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |            |

### CO-PO Mapping

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| 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> |
| CAT I                         | Written Examination                        | 30           |
| CAT II                        |                                            |              |
| CAT III                       |                                            |              |
| Continuous Assessment         | Assignment / Activities                    | 5            |
| Attendance                    | Based on course wise attendance percentage | 5            |
| <b>Total</b>                  |                                            | <b>40</b>    |

|          |                                                     |                 |          |          |          |               |
|----------|-----------------------------------------------------|-----------------|----------|----------|----------|---------------|
| EEC26103 | <b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|          |                                                     | ESC             | 3        | 0        | 0        | 3             |

#### Course Prerequisite / Preamble

- Introduce the fundamentals of electrical circuits and basic electrical quantities.
- Provide basic knowledge of DC, AC and magnetic circuits.
- Develop understanding of electrical wiring, safety, protection and earthing.
- Introduce semiconductor devices and basic electronic circuits.
- Provide fundamental knowledge of digital electronics and operational amplifiers.

#### Course Objectives

- Introduce the basic concepts of electrical circuits, DC and AC circuits, and magnetic circuits.
- Develop fundamental knowledge of electrical wiring, safety practices, protection devices and earthing.
- Introduce the operating principles and basic applications of semiconductor electronic devices.
- Provide fundamental knowledge of digital electronics, logic gates and basic digital circuits.
- Introduce the basic concepts and applications of operational amplifiers.

| CO  | COURSE OUTCOMES                                                                                                              | K LEVEL |
|-----|------------------------------------------------------------------------------------------------------------------------------|---------|
| CO1 | Apply basic laws and principles to analyze simple DC and magnetic circuits.                                                  | K2      |
| CO2 | Analyze basic AC circuits and determine voltage, current, power and power factor.                                            | K3      |
| CO3 | Explain basic electrical wiring, safety practices, protection devices, cables and earthing.                                  | K2      |
| CO4 | Explain the working principles and basic applications of semiconductor devices such as diodes, transistors, JFET and MOSFET. | K2      |
| CO5 | Apply basic concepts of logic gates, digital circuits and operational amplifiers to simple electronic applications.          | K3      |
| CO6 | Apply basic laws and principles to analyze simple DC and magnetic circuits.                                                  | K2      |

#### Syllabus

|                                                                                                                                                                                                                                                                                                                     |                                 |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------|
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                       | <b>DC AND MAGNETIC CIRCUITS</b> | <b>(9)</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)</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)</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)</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)</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.                                 |                                       |            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ol style="list-style-type: none"> <li>1. D. P. Kothari and I. J. Nagrath, <i>Basic Electrical Engineering</i>, 4th Edition, McGraw Hill Education (India), 2019.</li> <li>2. S. Salivahanan and N. Suresh Kumar, <i>Electronic Devices and Circuits</i>, 5th Edition, McGraw Hill Education (India), 2022.</li> </ol>                                                                                                                                                             |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ol style="list-style-type: none"> <li>1. V. K. Mehta and Rohit Mehta, <i>Principles of Electrical Engineering and Electronics</i>, Multicolour Edition, S. Chand Publishing, 2015.</li> <li>2. Thomas L. Floyd, <i>Electronic Devices (Conventional Current Version)</i>, 10th Edition, Pearson Education, 2017 (Global Edition updated 2025).</li> <li>3. R. P. Jain, <i>Modern Digital Electronics</i>, 4th Edition, McGraw Hill Education (Tata McGraw Hill), 2010.</li> </ol> |
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/108105053">https://nptel.ac.in/courses/108105053</a></li> <li>2. <a href="https://onlinecourses.nptel.ac.in/noc21_ee55/preview">https://onlinecourses.nptel.ac.in/noc21_ee55/preview</a></li> </ol>                                                                                                                                                                                                 |

### CO-PO Mapping

| CO  | 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   | -   | -   | -   | -   | -   | -   | -    | -    | 2    | 1    |
| CO4 | 3   | 2   | 1   | 1   | 1   | -   | -   | -   | -   | -    | -    | 2    | 1    |
| CO5 | 3   | 2   | 1   | 1   | 1   | -   | -   | -   | -   | -    | -    | 2    | 1    |

| <b>Assessment Methodology</b> |                                            |              |
|-------------------------------|--------------------------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b>                    | <b>Marks</b> |
| CAT I                         | Written Examination                        | 30           |
| CAT II                        |                                            |              |
| CAT III                       |                                            |              |
| Continuous Assessment         | Assignment / Activities                    | 5            |
| Attendance                    | Based on course wise attendance percentage | 5            |
| <b>Total</b>                  |                                            | <b>40</b>    |

|                 |                                                            |                 |          |          |          |               |
|-----------------|------------------------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>PCT26104</b> | <b>PHYSICS AND CHEMISTRY FOR<br/>ELECTRONICS ENGINEERS</b> | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|                 |                                                            | ESC             | 3        | 0        | 0        | 3             |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</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 Objective</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>To provide fundamental knowledge of physics and chemistry principles relevant to engineering applications.</li> <li>To develop understanding of materials, energy systems, and modern technological advancements.</li> <li>To apply scientific concepts in solving engineering and industrial problems effectively.</li> <li>To enhance analytical, experimental, and problem-solving skills through practical learning.</li> <li>To create awareness of sustainable technologies, environmental protection, and interdisciplinary engineering applications.</li> </ul> |

| <b>CO</b>  | <b>COURSE OUTCOMES</b>                                                                                                      | <b>K LEVEL</b> |
|------------|-----------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>CO1</b> | Explain the fundamental concepts of physics and chemistry relevant to engineering applications.                             | K2             |
| <b>CO2</b> | Apply principles of materials science, optics, electrochemistry, and energy systems in engineering problems.                | K2             |
| <b>CO3</b> | Analyze the properties and behavior of engineering materials, semiconductors, fuels, and chemical processes.                | K2             |
| <b>CO4</b> | Perform laboratory experiments and interpret scientific data using analytical and experimental techniques.                  | K2             |
| <b>CO5</b> | Demonstrate awareness of environmental sustainability, modern technologies, and interdisciplinary engineering applications. | K2             |

| <b>Syllabus</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                              |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------|
| <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.                                          |                                            |            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <ol style="list-style-type: none"> <li>1. Umesh K Mishra &amp; Jaspri Singh, "Semiconductor Device Physics and Design", Springer, 2008.</li> <li>2. Bhattacharya, D.K. &amp; Poonam, T. —Engineering Physics. 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>References:</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, 28th ED, 2020.</li> </ol> |
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/">https://nptel.ac.in/</a></li> <li>2. <a href="https://nptel.ac.in/courses/122103011">https://nptel.ac.in/courses/122103011</a></li> <li>3. <a href="https://www.nptel.ac.in/courses">https://www.nptel.ac.in/courses</a></li> </ol>                                                                                                                           |

**CO-PO MAPPING**

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

| Assessment Methodology |                                            |           |
|------------------------|--------------------------------------------|-----------|
| Assessment Methodology | Assessment Tools                           | Marks     |
| CAT I                  | Written Examination                        | 30        |
| CAT II                 |                                            |           |
| CAT III                |                                            |           |
| Continuous Assessment  | Assignment / Activities                    | 5         |
| Attendance             | Based on course wise attendance percentage | 5         |
| <b>Total</b>           |                                            | <b>40</b> |

| MET26105 | BASIC CIVIL AND MECHANICAL ENGINEERING | CATEGORY | L | T | P | CREDIT |
|----------|----------------------------------------|----------|---|---|---|--------|
|          |                                        | ESC      | 3 | 0 | 0 | 3      |

#### Course Prerequisite / Preamble

- Introduces the basic concepts and applications of Civil and Mechanical Engineering.
- Covers surveying, civil engineering materials, buildings, infrastructure, engines, power plants, pumps, refrigeration and air conditioning.
- Provides an understanding of engineering systems used in society and everyday life.

#### Course Objectives

- To introduce the major branches and applications of Civil and Mechanical Engineering.
- To provide basic knowledge of surveying, civil engineering materials, building components and infrastructure.
- To explain the working principles of engines, power plants, pumps, refrigeration and air conditioning systems.

| CO  | COURSE OUTCOMES                                                                              | K LEVEL |
|-----|----------------------------------------------------------------------------------------------|---------|
| CO1 | Explain the basic concepts and applications of Civil and Mechanical Engineering.             | K2      |
| CO2 | Describe basic surveying methods and common civil engineering materials.                     | K2      |
| CO3 | Explain building components, infrastructure and green building practices.                    | K2      |
| CO4 | Explain the working principles of engines, power plants, pumps and turbines.                 | K2      |
| CO5 | Explain the basic principles and applications of refrigeration and air conditioning systems. | K2      |

#### Syllabus

| Unit 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Introduction to Civil and Mechanical Engineering | (9) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----|
| <b>Civil Engineering:</b> Role in society – Major areas: Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering – National Building Code – Basic building terms: Plinth area, Carpet area, Floor area, Built-up area and Floor Space Index – Residential and Industrial buildings.<br><b>Mechanical Engineering:</b> Introduction – Contributions to society – Manufacturing, Automation, Automobile and Energy Engineering – Interdisciplinary applications. |                                                  |     |
| Unit 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Surveying and Civil Engineering Materials        | (9) |
| Surveying: Purpose – Classification – Basic principles – Measurement of distances and angles – Leveling – Area measurement – Contours.<br>Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel – Timber – Modern materials – Thermal and acoustic insulating materials – Decorative panels – Waterproofing materials – Uses of gypsum – Prefabricated building components.                                                                                                        |                                                  |     |

|                                                                                                                                                                                                                                                                                                                                                                                                      |                                                     |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------|
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                                                                                                        | <b>Building Components and Infrastructure</b>       | <b>(9)</b> |
| Classification of power plants – Working principles of Steam, Gas, Diesel, Hydroelectric and Nuclear power plants – Internal combustion engines – Petrol and Diesel engines – Two-stroke and Four-stroke cycles – Comparison – Boilers and turbines – Single-acting and double-acting reciprocating pumps – Centrifugal pumps – Hybrid engines – Industrial safety practices and protective devices. |                                                     |            |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                                                                                                        | <b>Internal Combustion Engines and Power Plants</b> | <b>(9)</b> |
| Classification of power plants – Working principles of Steam, Gas, Diesel, Hydroelectric and Nuclear power plants – Internal combustion engines – Petrol and Diesel engines – Two-stroke and Four-stroke cycles – Comparison – Boilers and turbines – Single-acting and double-acting reciprocating pumps – Centrifugal pumps – Hybrid engines – Industrial safety practices and protective devices. |                                                     |            |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                                                                                                        | <b>Refrigeration and Air Conditioning</b>           | <b>(9)</b> |
| Basic terminology – Principle of refrigeration – Vapour Compression and Vapour Absorption systems – Layout of domestic refrigerator – Window and Split air conditioners – Properties of air-water mixture – Introduction to psychrometry – Basic psychrometric processes.                                                                                                                            |                                                     |            |

#### Text Books:

1. S. Ramamrutham, *Basic Civil Engineering*, 3rd Edition, Dhanpat Rai Publishing Company, 2013.
2. R. S. Khurmi and J. K. Gupta, *A Textbook of Thermal Engineering (SI Units)*, S. Chand Publishing, 2022.

#### References:

1. R. K. Bansal, *A Textbook of Fluid Mechanics and Hydraulic Machines (SI Units)*, 9th Revised Edition, Laxmi Publications, 2014.
2. V. Ganesan, *Internal Combustion Engines*, 4th Edition, McGraw Hill Education (India), 2012.
3. C. P. Arora, *Refrigeration and Air Conditioning*, 3rd Edition, McGraw Hill Education / Tata McGraw Hill, 2010.

#### Web / NPTEL Resources:

1. <https://nptel.ac.in/courses/108105159>
2. <https://nptel.ac.in/courses/117106108>

#### CO-PO Mapping

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

| <b>Assessment Methodology</b> |                                            |              |
|-------------------------------|--------------------------------------------|--------------|
| <b>Assessment Methodology</b> | <b>Assessment Tools</b>                    | <b>Marks</b> |
| CAT I                         | Written Examination                        | 30           |
| CAT II                        |                                            |              |
| CAT III                       |                                            |              |
| Continuous Assessment         | Assignment / Activities                    | 5            |
| Attendance                    | Based on course wise attendance percentage | 5            |
| <b>Total</b>                  |                                            | <b>40</b>    |

|                 |                                                                        |                 |          |          |          |               |
|-----------------|------------------------------------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>EEL26101</b> | <b>BASIC ELECTRICAL AND<br/>ELECTRONICS ENGINEERING<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>    |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                    |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------|
| <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 Objectives</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 and electrical safety.</li> </ul>   |                                                                                                    |                |
| <b>CO</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>COURSE OUTCOMES</b>                                                                             | <b>K LEVEL</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.  | K4             |
| <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>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ol style="list-style-type: none"> <li>1. D. P. Kothari and I. J. Nagrath, <i>Basic Electrical Engineering</i>, 4th Edition, McGraw Hill Education (India), 2019.</li> <li>2. S. Salivahanan and N. Suresh Kumar, <i>Electronic Devices and Circuits</i>, 5th Edition, McGraw Hill Education (India), 2022.</li> <li>3. M. Morris Mano, <i>Digital Logic and Computer Design</i>, Pearson India, 2016/2017 reprint.</li> </ol>                                                                       |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ol style="list-style-type: none"> <li>1. V. K. Mehta and Rohit Mehta, <i>Principles of Electrical Engineering and Electronics</i>, S. Chand Publishing, 2015.</li> <li>2. Thomas L. Floyd, <i>Electronic Devices</i>, 10th Edition, Pearson Education, 2017.</li> <li>3. R. P. Jain, <i>Modern Digital Electronics</i>, 4th Edition, McGraw Hill Education, 2010.</li> <li>4. Ramakant A. Gayakwad, <i>Op-Amps and Linear Integrated Circuits</i>, 4th Edition, Pearson Education, 2015.</li> </ol> |
| <b>Web / NPTEL Resources:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/108105053">https://nptel.ac.in/courses/108105053</a></li> <li>2. <a href="https://onlinecourses.nptel.ac.in/noc21_ee55/preview">https://onlinecourses.nptel.ac.in/noc21_ee55/preview</a></li> </ol>                                                                                                                                                                                                                   |

### CO PO Mapping

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

| 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    |

| PCL26102                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | PHYSICS & CHEMISTRY<br>LABORATORY                                                 | CATEGORY | L | T | P | CREDIT  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------|---|---|---|---------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                   | BSC      | 0 | 0 | 3 | 1.5     |
| Course Prerequisite / Preamble                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                   |          |   |   |   |         |
| <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>                                                                                                                                                                                    |                                                                                   |          |   |   |   |         |
| Course Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                   |          |   |   |   |         |
| <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> |                                                                                   |          |   |   |   |         |
| CO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | COURSE OUTCOMES                                                                   |          |   |   |   | K LEVEL |
| CO1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Perform Physics experiments using standard laboratory instruments and techniques. |          |   |   |   | K3      |
| CO2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Analyse experimental results and verify scientific principles in Physics.         |          |   |   |   | K4      |
| CO3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Conduct Chemistry experiments related to volumetric and instrumental analysis.    |          |   |   |   | K3      |
| CO4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Apply safety measures and good laboratory practices during experiments            |          |   |   |   | K3      |
| CO5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Interpret experimental observations and prepare laboratory reports effectively    |          |   |   |   | K4      |
| Physics Laboratory                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |          |   |   |   |         |
| List of Experiments                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                   |          |   |   |   |         |
| 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>Chemistry Laboratory</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>List of Experiments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1. Kinetic study of acid hydrolysis of ethyl acetate/Total hardness of water - Determination by EDTA method.                                                                                                                                                                                                                                                                                                                                                                                     |
| 2. Freundlich adsorption isotherm - Adsorption of acetic acid on charcoal/Chloride content of water - Determination by Mohr's method.                                                                                                                                                                                                                                                                                                                                                            |
| 3. Determination of oxalic acid by permanganometry/Determination of ferrous by Permanganometry.                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4. Determination of carbonate and bicarbonate in a mixture/Beer-Lamberts law - Determination of ferrous by colorimetry.                                                                                                                                                                                                                                                                                                                                                                          |
| 5. Magnesium content in water - Determination by EDTA method/Acetic acid content in Vinegar.                                                                                                                                                                                                                                                                                                                                                                                                     |
| 6. Dissolved oxygen content in water - Determination by Winkler's method/Determination of available chlorine in bleaching powder.                                                                                                                                                                                                                                                                                                                                                                |
| 7. Conductometric titration/Potentiometric titration.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 8. Chemical analysis of salt for cations and anions.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Total Hours: 45</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ol style="list-style-type: none"> <li>1. C. L. Arora, <i>B.Sc. Practical Physics</i>, S. Chand &amp; Co. Ltd., latest reprint/revised edition, 2022</li> <li>2. J. Mendham, R. C. Denney, J. D. Barnes and M. Thomas, <i>Vogel's Textbook of Quantitative Chemical Analysis</i>, Pearson Education, 6th Edition, 2009.</li> <li>3. V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, <i>Basic Principles of Practical Chemistry</i>, Sultan Chand &amp; Sons, New Delhi, 2012.</li> </ol> |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ol style="list-style-type: none"> <li>1. V. K. Ahluwalia (with Sunita Dhingra), <i>College Practical Chemistry</i>, Universities Press, 2005.</li> <li>2. P. R. Sasi Kumar, <i>Practical Physics</i>, PHI Learning (Prentice-Hall of India), 2011.</li> </ol>                                                                                                                                                                                                                                   |
| <b>Web / NPTEL Links</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ol style="list-style-type: none"> <li>1. <a href="https://www.olabs.edu.in/">https://www.olabs.edu.in/</a></li> <li>2. <a href="https://vlab.amrita.edu/">https://vlab.amrita.edu/</a></li> </ol>                                                                                                                                                                                                                                                                                               |

**CO-PO MAPPING**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | 3   | 2   | -   | 2   | 3   | -   | -   | 1   | 2   | 1    | -    | 2    | 1    |
| CO2 | 2   | 3   | -   | 3   | 2   | -   | -   | 1   | 2   | 2    | -    | 2    | 1    |
| CO3 | 3   | 3   | -   | 3   | 2   | -   | 1   | 1   | 2   | 1    | -    | 2    | 2    |
| CO4 | 2   | 1   | -   | 2   | 2   | 2   | 3   | 3   | 1   | 1    | -    | 1    | 1    |
| CO5 | 2   | 2   | -   | 3   | 2   | -   | -   | 1   | 2   | 3    | 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>MEL26103</b> | <b>ENGINEERING DRAWING<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**

- 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 Objectives**

- 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.

| <b>CO</b> | <b>COURSE OUTCOMES</b>                                                                                                                | <b>K LEVEL</b> |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------|----------------|
| 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             |

| <b>S.No</b> | <b>List of Experiments</b>                                                                                                                                     |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1           | Drawing of engineering curves – Ellipse (Concentric circles method and Oblong method), Parabola and Hyperbola                                                  |
| 2           | Drawing of engineering curves – Cycloid, Epicycloid, Hypocycloid, and Involute of a circle and a square                                                        |
| 3           | Projection of points – projection of points in all four quadrants; determination of quadrant from given projections                                            |
| 4           | Projection of straight lines – lines parallel and inclined to both reference planes; determination of true length and true inclination by rotating line method |

|    |                                                                                                                                                  |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 5  | Projection of planes – projection of triangular, rectangular, pentagonal, and hexagonal planes in various positions                              |
| 6  | Projection of regular solids (prisms and pyramids) with axis perpendicular and inclined to the reference planes                                  |
| 7  | Projection of regular solids (cylinders and cones) with axis inclined to HP and VP; true shape of sections                                       |
| 8  | Development of lateral surfaces of prisms, cylinders, pyramids, and cones (including cut solids)                                                 |
| 9  | Isometric projection and isometric view of simple and combination solids; conversion from orthographic multi-view to isometric view              |
| 10 | Perspective projection of prisms and pyramids using visual ray method; conversion of pictorial views to orthographic projections (Mini-Exercise) |

#### Text Books:

1. Venugopal, K., *Engineering Drawing and Graphics + AutoCAD*, New Age International Publishers, New Delhi, 5th Edition, 2020.
2. Bhatt, N.D., *Engineering Drawing: Plane and Solid Geometry*, Charotar Publishing House, 53rd Edition, 2022.
3. Gopalakrishna, K.R., *Engineering Drawing (Vol. I & II)*, Subhas Stores, Bangalore, 2019.

#### References:

1. French, T.E. and Vierck, C.J., *Engineering Drawing and Graphic Technology*, McGraw-Hill, New York, 2005.
2. Shah, M.B. and Rana, B.C., *Engineering Drawing*, Pearson Education, New Delhi, 2nd Edition, 2009.
3. BIS Standards Publication SP: 46 (*Engineering Drawing Practice for Schools and Colleges*), Bureau of Indian Standards, New Delhi.

#### CO PO Mapping

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| 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           |

| CDC26101 | CAREER DEVELOPMENT SKILL-I | CATEGORY | L | T | P | CREDIT |
|----------|----------------------------|----------|---|---|---|--------|
|          |                            | 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 Objectives</b>                                                                                                                                                                                                                                                                                                                                          |                                                                                                                  |                |
| <ul style="list-style-type: none"> <li>• To improve communication, listening, and speaking skills.</li> <li>• To build vocabulary and basic grammar skills.</li> <li>• To solve basic mathematical aptitude problems.</li> <li>• To develop logical and analytical thinking skills.</li> <li>• To improve personality, confidence, and teamwork skills</li> </ul> |                                                                                                                  |                |
| <b>CO</b>                                                                                                                                                                                                                                                                                                                                                         | <b>COURSE OUTCOMES</b>                                                                                           | <b>K LEVEL</b> |
| <b>CO1</b>                                                                                                                                                                                                                                                                                                                                                        | Develop effective verbal and non-verbal communication skills for academic and professional environments.         | K2             |
| <b>CO2</b>                                                                                                                                                                                                                                                                                                                                                        | Apply basic quantitative aptitude concepts to solve numerical and logical problems efficiently.                  | K3             |
| <b>CO3</b>                                                                                                                                                                                                                                                                                                                                                        | Demonstrate improved vocabulary, grammar, and sentence construction skills for professional communication.       | K3             |
| <b>CO4</b>                                                                                                                                                                                                                                                                                                                                                        | Analyze and solve basic reasoning and analytical problems using logical thinking techniques.                     | K4             |
| <b>CO5</b>                                                                                                                                                                                                                                                                                                                                                        | Exhibit positive attitude, teamwork, confidence, and time management skills for personal and career development. | K3             |

|                                                                                                                                                                            |                                         |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------|
| <b>Syllabus</b>                                                                                                                                                            |                                         |            |
| <b>Unit 1</b>                                                                                                                                                              | <b>Communication Fundamentals</b>       | <b>(9)</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>(9)</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>(9)</b> |
| Number System, Simplification, HCF & LCM, Percentages, Ratio & Proportion, and Average Problems.                                                                           |                                         |            |
| <b>Unit 4</b>                                                                                                                                                              | <b>Logical Reasoning – Introduction</b> | <b>(9)</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>(9)</b> |
| Goal Setting, Positive Attitude, Confidence Building, Time Management, Team Work Activities, and Stress Management Basics. |                                |            |

|                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ol style="list-style-type: none"> <li>1. R. S. Aggarwal, <i>Quantitative Aptitude for Competitive Examinations</i>, S. Chand Publishing, Revised Edition, 2024.</li> <li>2. Barun K. Mitra and Basundhara Mitra, <i>Personality Development and Soft Skills</i>, Oxford University Press, 3rd Edition, 2024.</li> <li>3. S. P. Dhanavel, <i>English and Soft Skills</i>, Orient BlackSwan, 2nd Edition, 2018.</li> </ol> |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ol style="list-style-type: none"> <li>1. Norman Lewis, <i>Word Power Made Easy</i>, Goyal Publishers, Revised and Expanded Indian Edition, 2012.</li> <li>2. M. Tyra, <i>Magical Book on Quicker Maths</i>, BSC Publishing Co. Pvt. Ltd., 6th Revised Edition, 2022.</li> <li>3. Dale Carnegie, <i>How to Win Friends and Influence People</i>, Simon and Schuster, Revised Edition, 1981.</li> </ol>                    |

### CO PO Mapping

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 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    | -    |

| 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         |
| <b>Total</b>                       |                                     | <b>100</b> |

| PEC26101 | PHYSICAL EDUCATION<br>AND SPORTS<br>ACTIVITY | CATEGORY | L | T | P | CREDIT |
|----------|----------------------------------------------|----------|---|---|---|--------|
|          |                                              | AEC      | 0 | 0 | 1 | -      |

| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------|
| <ul style="list-style-type: none"> <li>• This course focuses on physical fitness, sports participation, health awareness, and personality development through regular physical education and training activities.</li> <li>• 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.</li> <li>• The course promotes discipline, teamwork, leadership, sportsmanship, and healthy lifestyle habits.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |         |
| <b>Course Objectives</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |         |
| <ul style="list-style-type: none"> <li>• To promote physical fitness and healthy lifestyle practices among students.</li> <li>• To develop interest and participation in sports and physical activities.</li> <li>• To improve physical endurance, flexibility, coordination, and mental fitness.</li> <li>• To encourage teamwork, discipline, leadership, and sportsmanship qualities.</li> <li>• To create awareness about health, nutrition, and wellness practices.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                           |         |
| CO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | COURSE OUTCOMES                                                                                           | K LEVEL |
| CO1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Understand the importance of physical fitness, sports, and healthy lifestyle practices.                   | K2      |
| CO2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Perform basic physical exercises and fitness activities effectively.                                      | K3      |
| CO3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Demonstrate participation in sports and recreational activities with discipline and teamwork.             | K2      |
| CO4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Apply health, hygiene, nutrition, and wellness practices for physical well-being.                         | K4      |
| CO5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Develop leadership qualities, sportsmanship, and positive attitude through physical education activities. | K3      |
| <b>LIST OF ACTIVITIES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |         |
| <ol style="list-style-type: none"> <li>1. Introduction to physical fitness, health awareness, and importance of physical education.</li> <li>2. Warm-up exercises, stretching, and flexibility training.</li> <li>3. Physical fitness exercises for endurance, strength, and coordination.</li> <li>4. Practice sessions in athletics – running, relay, jumping, and basic field events.</li> <li>5. Training in indoor and outdoor sports activities.</li> <li>6. Team games and recreational activities for teamwork and leadership development.</li> <li>7. Yoga, breathing exercises, and relaxation techniques for mental wellness.</li> <li>8. Awareness programme on nutrition, hygiene, and healthy lifestyle practices.</li> <li>9. Participation in sports events, fitness competitions, and physical training drills.</li> <li>10. Physical fitness assessment, activity record submission, and performance evaluation.</li> </ol> |                                                                                                           |         |
| <b>GUIDELINES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                           |         |
| <ol style="list-style-type: none"> <li>1. Students shall actively participate in all physical education and sports activities.\</li> <li>2. Proper sports attire and discipline shall be maintained during training sessions.</li> <li>3. Students shall follow safety measures and instructor guidelines during physical activities.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                           |         |

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.

#### References:

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>

#### CO PO Mapping

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| 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    |

#### Assessment Methodology

| Assessment Methodology        | Assessment Tools                                              | Marks      |
|-------------------------------|---------------------------------------------------------------|------------|
| 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         |
| <b>Total</b>                  |                                                               | <b>100</b> |

# **SEMESTER - II**

|          |                                               |          |   |   |   |        |
|----------|-----------------------------------------------|----------|---|---|---|--------|
| MAC26201 | PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS | CATEGORY | L | T | P | CREDIT |
|          |                                               | BSC      | 3 | 1 | 0 | 4      |

| Course Prerequisite / Preamble                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                      |  |  |  |  |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|---------|
| <ul style="list-style-type: none"> <li>• Basic knowledge of Engineering Mathematics – I, calculus, differential equations, and complex numbers.</li> <li>• Understanding of integration, matrices, and elementary transforms.</li> <li>• 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.</li> </ul> |                                                                                                                                                                      |  |  |  |  |         |
| Course Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                      |  |  |  |  |         |
| <ul style="list-style-type: none"> <li>• To formulate and solve problems involving analytic functions and conformal mappings.</li> <li>• To understand and apply Taylor and Laurent series expansions for complex functions.</li> <li>• To understand Laplace transforms and their properties.</li> <li>• To apply Laplace transforms in solving ordinary differential equations and simultaneous differential equations.</li> <li>• To understand and apply Fourier transform techniques and their engineering applications.</li> </ul>                                                                                                          |                                                                                                                                                                      |  |  |  |  |         |
| CO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | COURSE OUTCOMES                                                                                                                                                      |  |  |  |  | K LEVEL |
| 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                                                                                                                                                                                                                                                               |                   |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|
| UNIT 1                                                                                                                                                                                                                                                                 | Derivatives       | (12) |
| 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. |                   |      |
| UNIT 2                                                                                                                                                                                                                                                                 | Complex Functions | (12) |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------|
| <p>Conformal mapping – Simple and standard transformations like <math>w = z + c</math>, <math>cz</math>, <math>z^2</math>, <math>e^z</math>, <math>\sin z</math>, <math>\cosh z</math> and <math>z +</math> Bilinear transformation and cross ratio property (excluding Schwarz-Christoffel transformation).<br/>Taylor's <math>z</math> and Laurent's theorem (without proof) – Series expansion of complex valued functions – Classification of singularities.</p> |                        |             |
| <b>UNIT 3</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 4</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 5</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.                                                                                                                                                                                                                                                                             |                        |             |

|                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                                 |
| <ol style="list-style-type: none"> <li>1. Veerarajan T., <i>Engineering Mathematics for First Year</i>, Tata McGraw Hill, 2010.</li> <li>2. Venkataraman M.K., <i>Engineering Mathematics, Vol. II &amp; III</i>, National Publishing Company, Chennai, 2012.</li> <li>3. B.S. Grewal, <i>Higher Engineering Mathematics</i>, Khanna Publishers, Delhi, 2007.</li> </ol>                          |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                |
| <ol style="list-style-type: none"> <li>1. Erwin Kreyszig, <i>Advanced Engineering Mathematics</i>, 7th Edition, Wiley India, 2007.</li> <li>2. Bali N.P. and Manish Goyal, <i>Text Book of Engineering Mathematics</i>, 3rd Edition, Laxmi Publications Pvt. Ltd., 2008.</li> <li>3. Grewal B.S., <i>Higher Engineering Mathematics</i>, 40th Edition, Khanna Publishers, Delhi, 2007.</li> </ol> |

|                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                       |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/111105134">https://nptel.ac.in/courses/111105134</a></li> <li>2. <a href="https://onlinecourses.nptel.ac.in/noc22_ma08/preview">https://onlinecourses.nptel.ac.in/noc22_ma08/preview</a></li> </ol> |

**CO PO Mapping**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| 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> |
| CAT I                         | Written Examination                        | 30           |
| CAT II                        |                                            |              |
| CAT III                       |                                            |              |
| Continuous Assessment         | Assignment / Activities                    | 5            |
| Attendance                    | Based on course wise attendance percentage | 5            |
| <b>Total</b>                  |                                            | <b>40</b>    |

|          |                        |          |   |   |   |        |
|----------|------------------------|----------|---|---|---|--------|
| UHC26202 | UNIVERSAL HUMAN VALUES | CATEGORY | L | T | P | CREDIT |
|          |                        | HSM      | 3 | 0 | 0 | 3      |

### Course Prerequisite / Preamble

- The course requires an open mind and willingness to reflect upon one's values, relationships, responsibilities, and purpose in life.
- This course introduces the fundamental principles of Universal Human Values and helps students understand the importance of harmony within oneself, family, society, and nature.
- It encourages self-exploration, ethical living, responsible behaviour, and the development of right understanding, leading to a meaningful and harmonious life.

### Course Objectives

- To understand the significance of human values and ethical behavior.
- To develop self-awareness and harmony in individual and social life.
- To inculcate professional ethics and social responsibility among students.
- To create awareness about sustainable living and environmental harmony.
- To promote holistic development for responsible citizenship and professional practice

| CO  | COURSE OUTCOMES                                                                    | K LEVEL |
|-----|------------------------------------------------------------------------------------|---------|
| CO1 | Understand the importance of human values and ethical principles.                  | K2      |
| CO2 | Apply self-exploration methods for personal development and harmony.               | K3      |
| CO3 | Analyze the role of relationships, family, and society in human life.              | K4      |
| CO4 | Interpret professional ethics and social responsibilities in engineering practice. | K4      |
| CO5 | Evaluate sustainable living practices for harmony with nature and society.         | K5      |

| Syllabus                                                                                                                                                                                                                                                                        |                                             |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------|
| <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)</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.                                |                                             |            |

**Text Books:**

1. A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Sangal and G.P. Bagaria, Excel Books, 2nd Edition, 2010.
2. Human Values, A.N. Tripathi, New Age International Publishers, 2nd Edition, 2018.
3. Professional Ethics and Human Values, M. Govindarajan, S. Natarajan and V.S. Senthil Kumar, PHI Learning, 1st Edition, 2013.
4. Human Values and Professional Ethics, B.S. Nagarajan, Scitech Publications, 1st Edition, 2015.

**CO-PO Mapping**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| 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    |

**Assessment Methodology**

| Assessment Methodology | Assessment Tools                           | Marks     |
|------------------------|--------------------------------------------|-----------|
| CAT I                  | Written Examination                        | 30        |
| CAT II                 |                                            |           |
| CAT III                |                                            |           |
| Continuous Assessment  | Assignment / Activities                    | 5         |
| Attendance             | Based on course wise attendance percentage | 5         |
| <b>Total</b>           |                                            | <b>40</b> |

|          |                                    |          |   |   |   |        |
|----------|------------------------------------|----------|---|---|---|--------|
| PPC26203 | Problem Solving and Python Program | CATEGORY | L | T | P | CREDIT |
|          |                                    | ESC      | 3 | 0 | 0 | 3      |

### Course Prerequisite / Preamble

- Basic understanding of computers, logical reasoning, and programming fundamentals.
- This course provides the foundation for developing problem-solving skills and programming applications using Python.

### Course Objectives

- To understand the fundamentals of Python programming language.
- To apply decision-making and looping concepts in problem solving.
- To develop modular programming skills using functions and modules.
- To learn Python data structures and file handling techniques.
- To implement object-oriented programming concepts using Python.

| 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.                                                        |                                              |            |

### Text Books

1. Python Programming Using Problem Solving Approach, Reema Thareja, Oxford University Press, 1st Edition, 2017.
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson Education, 3rd Edition, 2023.
3. Python for Programmers, Paul Deitel and Harvey Deitel, Pearson Publications, 1st Edition, 2020.

### References:

1. Learning Python, Mark Lutz, O'Reilly Publications, 5th Edition, 2013.
2. Think Python, Allen B. Downey, Green Tea Press, 2nd Edition, 2015.
3. Fundamentals of Python, Kenneth A. Lambert, Cengage Learning, 2nd Edition, 2011.

#### CO PO Mapping

| CO  | 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    |

| Assessment Methodology |                                            |           |
|------------------------|--------------------------------------------|-----------|
| Assessment Methodology | Assessment Tools                           | Marks     |
| CAT I                  | Written Examination                        | 30        |
| CAT II                 |                                            |           |
| CAT III                |                                            |           |
| Continuous Assessment  | Assignment / Activities                    | 5         |
| Attendance             | Based on course wise attendance percentage | 5         |
| <b>Total</b>           |                                            | <b>40</b> |

| BET26204 | BIOLOGY FOR<br>ELECTRONICS ENGINEERS | CATEGORY | L | T | P | CREDIT |
|----------|--------------------------------------|----------|---|---|---|--------|
|          |                                      | BSC      | 3 | 0 | 0 | 3      |

| Course Prerequisite / Preamble                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                               |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------|
| <ul style="list-style-type: none"> <li>Basic knowledge of school-level biology and chemistry.</li> <li>Fundamental understanding of physics, electricity and electronics.</li> <li>Basic knowledge of signals and systems is desirable but not mandatory.</li> <li>Interest in interdisciplinary applications of biology and engineering.</li> </ul> <p>Prior knowledge of biotechnology or biomedical engineering is required.</p>                                                                     |                                                                               |         |
| Course Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                               |         |
| <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> |                                                                               |         |
| CO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | COURSE OUTCOMES                                                               | K LEVEL |
| CO1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Understand the structure and functions of cells and biomolecules.             | K2      |
| CO2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Explain biological processes and metabolic pathways relevant to engineering.  | K2      |
| CO3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Apply genetics and biotechnology concepts in engineering applications.        | K3      |
| CO4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Analyse environmental and biomedical applications of biology.                 | K4      |
| CO5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Interpret the role of biological systems in sustainable engineering solutions | K5      |
| Syllabus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                               |         |
| Unit 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Cell Biology                                                                  | (9)     |
| 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.                                                                                                                                                                                                                                    |                                                                               |         |
| Unit 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Biomolecules and Enzymes                                                      | (9)     |
| 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.                                                                                                                                                                                                                                                          |                                                                               |         |
| Unit 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Genetics and Biotechnology                                                    | (9)     |

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 4</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 5</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. |                                                   |            |

#### Text Books

1. Biology for Engineers, Arthur T. Johnson, CRC Press, 1st Edition, 2011.
2. Biology for Engineers, Arthur T. Johnson, Academic Press, 1st Edition, 2011.
3. Biology, Campbell and Reece, Pearson Education, 10th Edition, 2014.
4. Biotechnology, U. Satyanarayana, Books and Allied Publications, 1st Edition, 2005.

#### References:

1. Principles of Biochemistry, Lehninger, W.H. Freeman Publications, 7th Edition, 2017.
2. Microbiology, Prescott, McGraw Hill Education, 11th Edition, 2020.
3. Biotechnology, B.D. Singh, Kalyani Publishers, 6th Edition, 2021.
4. Principles of Anatomy and Physiology, Gerard J. Tortora, Wiley Publications, 16th Edition, 2021.

#### Web / NPTEL Resources

1. <https://nptel.ac.in/courses/121106008>
2. <https://nptel.ac.in/courses/102106081>

#### CO-PO Mapping

| CO  | 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> |
| CAT I                         | Written Examination                        | 30           |
| CAT II                        |                                            |              |
| CAT III                       |                                            |              |
| Continuous Assessment         | Assignment / Activities                    | 5            |
| Attendance                    | Based on course wise attendance percentage | 5            |
| <b>Total</b>                  |                                            | <b>40</b>    |

| ECT26205 | CIRCUIT ANALYSIS | CATEGORY | L | T | P | CREDIT |
|----------|------------------|----------|---|---|---|--------|
|          |                  | PCC      | 3 | 1 | 0 | 4      |

| 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 Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                               |         |
| <ul style="list-style-type: none"> <li>To understand the need for various theorems to solve complicated Electrical circuits.</li> <li>To explore the use of Resonant circuits and tuned circuits in the field of communication.</li> <li>To analyze the transient behavior of Electrical circuits.</li> <li>To identify the ways and means to solve magnetically coupled circuits.</li> <li>To understand the use of network topology in circuit solving.</li> </ul> |                                                                                                                                                                                               |         |
| CO                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | COURSE OUTCOMES                                                                                                                                                                               | K LEVEL |
| CO1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Apply network theorems and source transformation techniques to analyze and solve DC circuits.                                                                                                 | K3      |
| CO2                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Analyze AC circuits using phasor techniques, network theorems, resonance, bandwidth, quality factor, and selectivity concepts.                                                                | K4      |
| CO3                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Analyze the transient and complete responses of first- and second-order circuits subjected to DC, exponential, and sinusoidal excitations using time-domain and Laplace transform techniques. | K4      |
| CO4                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Analyze magnetically coupled circuits using self-inductance, mutual inductance, dot convention, coefficient of coupling, and equivalent circuit techniques.                                   | K4      |
| CO5                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Apply graph-theoretic concepts, matrices, trees, cutsets, tiesets and duality to formulate and analyze electrical networks.                                                                   | K3      |

| SYLLABUS                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|
| <b>Unit 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>DC Circuit Analysis</b>           | <b>(12)</b> |
| Sources-Transformation and manipulation, Network theorems -Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, Compensation theorem, Maximum power transfer theorem and Tellegen's theorem – Application to DC circuit analysis.                                                                                                                                                                       |                                      |             |
| <b>Unit 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>AC Circuit Analysis</b>           | <b>(12)</b> |
| Series circuits - RC, RL and RLC circuits and Parallel circuits –RLC circuits -Sinusoidal steady state response - Mesh and Nodal analysis - Analysis of circuits using Superposition, Thevenin's, Norton's and Maximum power transfer theorems. Resonance - Series resonance - Parallel resonance - Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency – Bandwidth – Q factor -Selectivity. |                                      |             |
| <b>Unit 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Transient Analysis</b>            | <b>(12)</b> |
| Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by DC and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation-Transient analysis by Laplace Transformation Technique.                                                                                                                                                                                            |                                      |             |
| <b>Unit 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Magnetically Coupled Circuits</b> | <b>(12)</b> |
| Self inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multi winding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.                                                                                                                                                                                                                              |                                      |             |
| <b>Unit 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Network Topology</b>              | <b>(12)</b> |
| Network terminology - Graph of a network - Incidence and reduced incidence matrices – Trees –Cutsets - Fundamental cutsets - Cutset matrix – Tiesets – Link currents and Tieset schedules -Twig voltages and Cutset schedules, Duality and dual networks.                                                                                                                                                                                               |                                      |             |
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |             |
| <ol style="list-style-type: none"> <li>1. William H. Hayt, Jr., Jack E. Kemmerly, Jamie D. Phillips and Steven M. Durbin, <i>Engineering Circuit Analysis</i>, 10th Edition, McGraw Hill, 2024.</li> <li>2. Mahmood Nahvi and Joseph A. Edminister, <i>Schaum's Outline of Electric Circuits</i>, 7th Edition, McGraw Hill Education, 2018.</li> </ol>                                                                                                  |                                      |             |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |             |
| <ol style="list-style-type: none"> <li>1. David A. Bell, <i>Electric Circuits</i>, 7th Edition, Oxford University Press, 2009.</li> <li>2. P. Ramesh Babu, <i>Electric Circuit Analysis</i>, 2nd Edition, Scitech Publications, 2010</li> </ol>                                                                                                                                                                                                         |                                      |             |

|                                                                                              |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| <b>Web / NPTEL Resources</b>                                                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. <a href="https://nptel.ac.in/courses/121106008">https://nptel.ac.in/courses/121106008</a> |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2. <a href="https://nptel.ac.in/courses/102106081">https://nptel.ac.in/courses/102106081</a> |  |  |  |  |  |  |  |  |  |  |  |  |  |

**CO-PO Mapping**

| CO  | 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> |                                            |           |
|-------------------------------|--------------------------------------------|-----------|
| Assessment Methodology        | Assessment Tools                           | Marks     |
| CAT I                         | Written Examination                        | 30        |
| CAT II                        |                                            |           |
| CAT III                       |                                            |           |
| Continuous Assessment         | Assignment / Activities                    | 5         |
| Attendance                    | Based on course wise attendance percentage | 5         |
| <b>Total</b>                  |                                            | <b>40</b> |

|                 |                                          |                 |          |          |          |               |
|-----------------|------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>PPL26201</b> | <b>PYTHON PROGRAMMING<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**

- 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 Objectives**

- 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.

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

|                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Experiments</b>                                                                                                                                                                                     |
| 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.                |
| 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.             |
| 3. Conditionals and Iterative, Loops Scientific problems using conditionals and iterative loops – Number Series, Number Patterns, Pyramid Pattern.                                                             |
| 4. Lists and Tuples Implementing real-time / technical applications using Lists and Tuples.                                                                                                                    |
| 5. Sets and Dictionaries, Implementing real-time / technical applications using Sets and Dictionaries – language components, automobile elements, civil structure elements; operations of Sets & Dictionaries. |
| 6. Functions, Implementing programs using Functions – Factorial, largest number in a list, area of shapes.                                                                                                     |
| 7. Strings- Implementing programs using Strings – reverse, palindrome check, character count, replacing characters.                                                                                            |
| 8. Modules and Python Standard Libraries Implementing programs using written modules and Python Standard Libraries – Pandas, NumPy, Matplotlib, SciPy.                                                         |
| 9. File Handling Implementing real-time / technical applications using File Handling – copy from one file to another, word count, longest word.                                                                |
| 10. Exception Handling- Implementing real-time / technical applications using Exception Handling – divide by zero error, voter's age validity, student mark range validation.                                  |
| 11. Pygame – Gaming Application Exploring Pygame tool; developing a game activity using Pygame – bouncing ball, car race, etc.                                                                                 |
| <b>Total Hours: 45</b>                                                                                                                                                                                         |

|                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                  |
| 1. 1. Python Reference Manual, Guido van Rossum, Python Software Foundation, 3rd Edition, 2026.                    |
| 2. Introducing Python: Modern Computing in Simple Packages, Bill Lubanovic, O'Reilly Media, 2nd Edition, 2019.     |
| 3. Python for Data Analysis, Wes McKinney, O'Reilly Media, 3rd Edition, 2022.                                      |
| <b>References:</b>                                                                                                 |
| 1. Guido van Rossum, Python Reference Manual – <a href="https://docs.python.org/3/">https://docs.python.org/3/</a> |
| 2. Bill Lubanovic, Introducing Python: Modern Computing in Simple Packages, O'Reilly Media, 2019.                  |
| 3. Wes McKinney, Python for Data Analysis, 3rd Edition, O'Reilly Media, 2022.                                      |
| <b>Web / NPTEL Resources</b>                                                                                       |
| 1. <a href="https://nptel.ac.in/courses/106106145">https://nptel.ac.in/courses/106106145</a>                       |
| 2. <a href="https://docs.python.org/3/tutorial/">https://docs.python.org/3/tutorial/</a>                           |

### CO PO Mapping

| CO  | 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    |

|            |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>CO5</b> | 2 | 2 | 3 | 2 | 2 | 1 | - | - | 2 | 1 | - | 3 | 2 |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|

| <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>MEL26202</b> | <b>ENGINEERING<br/>WORKSHOP PRACTICE<br/>LABORATORY – I</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>    |

| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                           |                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------|
| <ul style="list-style-type: none"> <li>This laboratory course provides practical exposure to basic manufacturing and workshop practices used in engineering applications.</li> <li>Students gain hands-on training in fitting, welding, carpentry, sheet metal, and lathe operations with emphasis on safety and skill development.</li> </ul>                                                                                                                                        |                                                                                           |                |
| <b>Course Objectives</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                           |                |
| <ul style="list-style-type: none"> <li>To familiarize students with common workshop tools and equipment.</li> <li>To develop practical skills in fitting, welding, carpentry, sheet metal, and lathe operations.</li> <li>To train students in safe handling of workshop machines and materials.</li> <li>To enhance fabrication and assembly skills through practical exercises.</li> <li>To provide exposure to basic manufacturing processes and engineering practices.</li> </ul> |                                                                                           |                |
| <b>CO</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>COURSE OUTCOMES</b>                                                                    | <b>K LEVEL</b> |
| 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>      |

| <b>List of Experiments</b>                                     |
|----------------------------------------------------------------|
| <b>FITTING SHOP</b>                                            |
| 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 chiseling operations.       |

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|                                                             |
|-------------------------------------------------------------|
| 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.                     |
| <b>Total Hours: 45</b>                                      |

|                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                                                                                                                                                                                                                                                                                                                    |
| <ol style="list-style-type: none"> <li>1. Hajra Choudhury, <i>Elements of Workshop Technology</i> (Vol. I &amp; II), Media Promoters &amp; Publishers, 17th/16th Edition, 2015.</li> <li>2. P. N. Rao, <i>Manufacturing Technology</i>, McGraw Hill Education, 5th Edition (Vol. 1), ~2018.</li> <li>3. K. C. John, <i>Mechanical Workshop Practice</i>, PHI Learning, 2nd Edition, 2010.</li> </ol> |
| <b>References:</b>                                                                                                                                                                                                                                                                                                                                                                                   |
| <ol style="list-style-type: none"> <li>1. S. K. Hajra Choudhury, <i>Elements of Workshop Technology</i>, Media Promoters &amp; Publishers, 17th/16th Edition, 2015.</li> <li>2. B. S. Raghuvanshi, <i>A Course in Workshop Technology</i>, Dhanpat Rai &amp; Co., latest printings 2015 (Vol. I) / 2017 (Vol. II).</li> </ol>                                                                        |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                                                                                                                                         |
| <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/112107145">https://nptel.ac.in/courses/112107145</a></li> <li>2. <a href="https://nptel.ac.in/courses/112104224">https://nptel.ac.in/courses/112104224</a></li> </ol>                                                                                                                                                 |

### CO PO Mapping

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

| <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           |

|          |                                        |          |   |   |   |        |
|----------|----------------------------------------|----------|---|---|---|--------|
| DTL26203 | DESIGN THINKING AND<br>IDEA LABORATORY | CATEGORY | L | T | P | CREDIT |
|          |                                        | ESC      | 0 | 0 | 3 | 1.5    |

#### 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.

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

#### List of Experiments

##### DESIGN THINKING BASICS

1. Introduction to design thinking and innovation process.
2. Empathy mapping and user requirement analysis
3. Problem definition and ideation techniques.

##### IDEATION AND CONCEPT DEVELOPMENT

1. Brainstorming and mind mapping for idea generation.
2. Idea screening and selection based on usefulness and feasibility
3. Concept sketching and simple solution planning.

##### PROTOTYPING AND TESTING

1. Low-cost prototype development using paper, cardboard, foam, or simple digital models.
2. Prototype testing and collection of user feedback.
3. Iteration and improvement of the prototype.

|                                                                                           |
|-------------------------------------------------------------------------------------------|
| <b>IDEA LABORATORY PROJECT</b>                                                            |
| 1. Low-cost prototype development using paper, cardboard, foam, or simple digital models. |
| 2. Prototype testing and collection of user feedback.                                     |
| 3. Iteration and improvement of the prototype.                                            |
| <b>INNOVATION AND PRESENTATION</b>                                                        |
| 1. Low-cost prototype development using paper, cardboard, foam, or simple digital models. |
| 2. Prototype testing and collection of user feedback.                                     |
| 3. Iteration and improvement of the prototype.                                            |
| <b>Total Hours: 45</b>                                                                    |

|                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                                                                                                                                                                                                |
| 1. Tim Brown, Change by Design, Harper Business, Revised & Updated Edition, 2019 (orig. 2009).<br>2. Vijay Kumar, 101 Design Methods, Wiley, 1st Edition, 2012.<br>3. Idris Mootee, Design Thinking for Strategic Innovation, Wiley, 1st Edition, 2013.                           |
| <b>References:</b>                                                                                                                                                                                                                                                                |
| 1. Change by Design, Tim Brown, Harper Business Publications, Revised & Updated Edition, 2019.<br>2. Design Thinking for Strategic Innovation, Idris Mootee, Wiley Publications, 1st Edition, 2013.<br>3. 101 Design Methods, Vijay Kumar, Wiley Publications, 1st Edition, 2012. |
| <b>Web / NPTEL Resources</b>                                                                                                                                                                                                                                                      |
| 1. <a href="https://nptel.ac.in/courses/110106124">https://nptel.ac.in/courses/110106124</a><br>2. <a href="https://www.ideo.com/">https://www.ideo.com/</a><br>3. <a href="https://www.interaction-design.org/">https://www.interaction-design.org/</a>                          |

### CO-PO Mapping

| CO  | 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 Laboratory Assignment /<br>Online Coding Assessment | Review                  | 10           |
| Model Creation                                              | Presentation            | 05           |
| Attendance                                                  |                         | 10           |
| Total                                                       |                         | 60           |

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

|                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Prerequisite / Preamble</b>                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>The students should possess a basic understanding of computer fundamentals, number systems, algorithms, and flowcharts.</li> <li>Familiarity with logical reasoning, problem-solving techniques, and basic mathematics will enable students to effectively learn structured programming concepts, data representation, control flow, and modular program design using the C language.</li> </ul> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objectives</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>Understand the fundamentals of programming and the C language environment.</li> <li>Learn to use operators, control statements, and looping constructs effectively.</li> <li>Develop modular programs using functions, arrays, and strings.</li> <li>Understand pointers, structures, and unions for efficient data handling.</li> <li>Apply file handling and dynamic memory management techniques to solve engineering problems.</li> </ul> |

| <b>CO</b>  | <b>COURSE OUTCOMES</b>                                                                            | <b>K LEVEL</b> |
|------------|---------------------------------------------------------------------------------------------------|----------------|
| <b>CO1</b> | Explain the fundamentals, structure, and data types used in C programming.                        | K2             |
| <b>CO2</b> | Apply operators, control statements, and looping constructs to solve problems.                    | K3             |
| <b>CO3</b> | Develop modular programs using functions, arrays, and strings.                                    | K3             |
| <b>CO4</b> | Implement pointers, structures, and unions for efficient data handling.                           | K3             |
| <b>CO5</b> | Design C programs using file handling and dynamic memory management for engineering applications. | K3             |

| <b>Syllabus</b>                                                                                                                                                                                                                                |                                        |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------|
| <b>Unit 1</b>                                                                                                                                                                                                                                  | <b>Introduction to C Programming</b>   | <b>(9)</b> |
| Introduction to computer programming - Algorithms and flowcharts - Structure of a C program - C tokens: keywords, identifiers, constants, variables - Data types and type conversion - Operators and expressions - Input and output statements |                                        |            |
| <b>Unit 2</b>                                                                                                                                                                                                                                  | <b>Control Statements and Looping</b>  | <b>(9)</b> |
| Decision making statements: if, if-else, nested if, switch-case - Looping statements: for, while, do-while - Break, continue and goto statements - Nested loops - Simple programs using control structures                                     |                                        |            |
| <b>Unit 3</b>                                                                                                                                                                                                                                  | <b>Functions, Arrays and Strings</b>   | <b>(9)</b> |
| Functions: definition, declaration, and types - Parameter passing: call by value and call by reference - Recursion - Storage classes - Arrays: one-dimensional and multi-dimensional arrays - Strings and string handling functions            |                                        |            |
| <b>Unit 4</b>                                                                                                                                                                                                                                  | <b>Pointers, Structures and Unions</b> | <b>(9)</b> |

|                                                                                                                                                                                                                                                        |                                            |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------|
| Pointers: declaration, initialization, and pointer arithmetic - Pointers and arrays - Pointers and functions - Structures: definition and usage - Nested structures - Unions - Structures and pointers                                                 |                                            |            |
| <b>Unit 5</b>                                                                                                                                                                                                                                          | <b>File Handling and Memory Management</b> | <b>(9)</b> |
| File operations: opening, reading, writing, and closing files - File handling functions - Dynamic memory allocation: malloc, calloc, realloc, free - Preprocessor directives and macros - Applications of C programming in engineering problem solving |                                            |            |

|                                                                                                           |
|-----------------------------------------------------------------------------------------------------------|
| <b>Text Books</b>                                                                                         |
| 1. Programming in ANSI C, E. Balagurusamy, McGraw Hill, 8th Edition, 2019.                                |
| 2. Let Us C, Yashavant Kanetkar, BPB Publications, 19th Edition, 2023.                                    |
| 3. The C Programming Language, Brian W. Kernighan & Dennis M. Ritchie, Pearson, 2nd Edition, 1988.        |
| <b>References:</b>                                                                                        |
| 1. Programming with C, Byron Gottfried, Schaum's Outline Series, McGraw Hill, 4th Edition, 2018.          |
| 2. C: The Complete Reference, Herbert Schildt, McGraw Hill, 4th Edition, 2000.                            |
| 3. Computer Fundamentals and Programming in C, Reema Thareja, Oxford University Press, 2nd Edition, 2014. |

### CO PO Mapping

| CO         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 3   | 2   | -   | -   | 2   | -   | -   | -   | -   | -    | -    | 1    |
| <b>CO2</b> | 3   | 3   | 2   | 1   | 2   | -   | -   | -   | -   | -    | -    | 1    |
| <b>CO3</b> | 3   | 3   | 3   | 2   | 3   | -   | -   | -   | -   | 1    | -    | 1    |
| <b>CO4</b> | 3   | 3   | 3   | 3   | 3   | -   | -   | -   | 1   | 1    | -    | 2    |
| <b>CO5</b> | 3   | 3   | 3   | 3   | 3   | 1   | 2   | -   | 2   | 2    | 1    | 2    |

| <b>Assessment Methodology</b>                            |                         |              |
|----------------------------------------------------------|-------------------------|--------------|
| <b>Assessment Methodology</b>                            | <b>Assessment Tools</b> | <b>Marks</b> |
| Laboratory Conduction                                    |                         | 20           |
| Virtual Laboratory Assignment / Online Coding Assessment | Review                  | 40           |
| Model Creation/Mini project                              | Presentation            | 20           |
| Attendance                                               |                         | 10           |
| Internal Quiz / Programming Test                         |                         | 10           |
| Total                                                    |                         | 100          |

|          |                                              |          |   |   |   |        |
|----------|----------------------------------------------|----------|---|---|---|--------|
| NSC26201 | PHYSICAL EDUCATION AND SPORTS ACTIVITIES/NSS | 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 Objectives</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 OUTCOMES                                                                                         | 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      |

| SYLLABUS                                                                                              |
|-------------------------------------------------------------------------------------------------------|
| <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>References:</b>                                                                                     |
| 1. National Service Scheme Manual, Government of India.                                                |
| 2. Youth Red Cross and Community Service Handbooks.                                                    |
| 3. Environmental and Rural Development Awareness Materials.                                            |
| 4. Swachh Bharat Mission and Social Welfare Programme Guidelines.                                      |
| <b>Web / NPTEL Resources</b>                                                                           |
| 1. <a href="https://nss.gov.in/">https://nss.gov.in/</a>                                               |
| 2. <a href="https://www.india.gov.in/">https://www.india.gov.in/</a>                                   |
| 3. <a href="https://www.mygov.in/">https://www.mygov.in/</a>                                           |
| 4. <a href="https://www.un.org/sustainabledevelopment/">https://www.un.org/sustainabledevelopment/</a> |

### CO-PO Mapping

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

| Assessment Methodology          |                                                     |       |
|---------------------------------|-----------------------------------------------------|-------|
| Assessment Methodology          | Assessment Tools                                    | Marks |
| 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   |