

# **B.E. - INFORMATION TECHNOLOGY**

## **Curriculum & Syllabus for Semester I and II**

### **REGULATIONS 2024 (Academic Year 2024-25 Onwards)**





K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

B.Tech. - Information Technology

(REGULATIONS 2024)

**Vision of the Institution**

|           |   |
|-----------|---|
| <b>IV</b> | We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world. |
|-----------|---|

**Mission of the Institution**

|             |   |
|-------------|---|
| <b>IM 1</b> | To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs. |
| <b>IM 2</b> | To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.  |

**Vision of the Department / Programme: (Information Technology)**

|           |  |
|-----------|--|
| <b>DV</b> | To produce excellent and competent software professional, researchers and responsible engineers, who can significantly contribute to environment friendly societal industry through quality education. |
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**Mission of the Department / Programme: (Information Technology)**


|             |  |
|-------------|--|
| <b>DM 1</b> | To make the students competitive and efficient in technical field through technological transformations in Information Technology, by providing them advanced curriculum, infrastructure and nurturing human values. |
| <b>DM 2</b> | To provide an excellent forum for higher studies that leads to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.                                      |

**Programme Educational Objectives (PEOs): (Information Technology)**

| The graduates of the programme will be able to |   |
|--|---|
| <b>PEO 1</b>                                   | <b>Engineering Acquaintance:</b> Incorporate with necessary background in science and engineering fundamentals to analyze and solve IT problems and prepare them skilled manpower in the field of IT for subsequently generation. |
| <b>PEO 2</b>                                   | <b>Modern Technical Tools:</b> Enhance in latest programming languages, technologies, software development process and communication technology.  |
| <b>PEO 3</b>                                   | <b>Personality Development:</b> Attain a successful career in industry through effective communication skills, team spirit, learning ethical responsibilities, attitude and adaptation to emerging technologies.                  |

**Programme Outcomes (POs) of B.Tech. - Information Technology**


| <b>Program Outcomes (POs)</b>           |  |
|---|--|
| <b>PO1</b>                              | <b>Engineering Graduates will be able to:</b><br><b>Engineering Knowledge:</b> Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.              |
| <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 to 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 & 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 & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).  |
| <b>PO6</b>                              | <b>The Engineer and The World:</b> Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).                                       |
| <b>PO7</b>                              | <b>Ethics:</b> Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & 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 documentation, 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)  |
| <b>Program Specific Outcomes (PSOs)</b> |  |
| <b>PSO1</b>                             | <b>Technical competency:</b> Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.   |
| <b>PSO2</b>                             | <b>Professional awareness:</b> Contribute core universal values and social good in the community.  |

|  |             | <b>K. S. R COLLEGE OF ENGINEERING</b><br>An Autonomous Institution<br>Approved by AICTE and Affiliated to Anna University, Chennai<br>Accredited by NAAC ('A++' Grade) |          |                |          |           |           |           | <b>Curriculum<br/>UG<br/>R - 2024</b> |    |     |
|---|-------------|--|----------|----------------|----------|-----------|-----------|-----------|---------------------------------------|----|-----|
| Department  |             | Department of Information Technology   |          |                |          |           |           |           |                                       |    |     |
| Programme   |             | B.Tech. - Information Technology   |          |                |          |           |           |           |                                       |    |     |
| SEMESTER I  |             |  |          |                |          |           |           |           |                                       |    |     |
| S. No.  | Course Code | Course Title   | Category | Periods / Week |          |           |           | Credit    | Max. Marks                            |    |     |
|   |             |  |          | L              | T        | P         | Tot       |           | CA                                    | ES | Tot |
| Induction Programme   |             |  | -        | -              | -        | -         | -         | -         | -                                     | -  | -   |
| THEORY COURSES  |             |  |          |                |          |           |           |           |                                       |    |     |
| 1   | 24ENT19     | Professional Communication   | HSMC     | 3              | 0        | 0         | 3         | 3         | 40                                    | 60 | 100 |
| 2   | 24EET06     | Basics of Electrical and Electronics Engineering   | ESC      | 3              | 0        | 0         | 3         | 3         | 40                                    | 60 | 100 |
| 3   | 24ITT16     | Programming for Problem Solving  | ESC      | 3              | 0        | 0         | 3         | 3         | 40                                    | 60 | 100 |
| 4   | 24GET19     | தமிழ்மரபு/Heritage of Tamils   | HSMC     | 1              | 0        | 0         | 1         | 1         | 40                                    | 60 | 100 |
| THEORY COURSES WITH LABORATORY COMPONENT  |             |  |          |                |          |           |           |           |                                       |    |     |
| 5   | 24MAI19     | Matrices and Calculus  | BSC      | 2              | 1        | 2         | 5         | 4         | 50                                    | 50 | 100 |
| 6   | 24CHI06     | Chemistry for Engineers  | BSC      | 3              | 0        | 2         | 5         | 4         | 50                                    | 50 | 100 |
| LABORATORY COURSES  |             |  |          |                |          |           |           |           |                                       |    |     |
| 7   | 24ITP16     | Programming for Problem Solving Laboratory   | ESC      | 0              | 0        | 2         | 2         | 1         | 60                                    | 40 | 100 |
| 8   | 24MEP16     | Engineering Graphics Laboratory  | ESC      | 1              | 0        | 2         | 3         | 2         | 60                                    | 40 | 100 |
| 9   | 24GEP16     | Engineering Experience Laboratory  | ESC      | 0              | 0        | 2         | 2         | 1         | 60                                    | 40 | 100 |
| EMPLOYABILITY ENHANCEMENT COURSE  |             |  |          |                |          |           |           |           |                                       |    |     |
| 10  | 24SSP19     | Aptitude and Coding Skills-I   | EEC      | 0              | 0        | 2         | 2         | 1         | 60                                    | 40 | 100 |
| <b>TOTAL</b>  |             |  |          | <b>16</b>      | <b>1</b> | <b>12</b> | <b>29</b> | <b>23</b> | <b>1000</b>                           |    |     |

| SEMESTER II                                     |             |  |          |                |          |           |           |           |            |    |     |
|---|-------------|--|----------|----------------|----------|-----------|-----------|-----------|------------|----|-----|
| S. No.  | Course Code | Course Title                                       | Category | Periods / Week |          |           |           | Credit    | Max. Marks |    |     |
|   |             |  |          | L              | T        | P         | Tot       |           | CA         | ES | Tot |
| <b>THEORY COURSES</b>                           |             |  |          |                |          |           |           |           |            |    |     |
| 1   | 24CST29     | Python Programming                                 | PCC      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 2   | 24CST21     | Design Thinking                                    | PCC      | 2              | 0        | 0         | 2         | 2         | 40         | 60 | 100 |
| 3   | 24GET29     | தமிழரும் தொழில் நுட்பமும்/<br>Tamil and Technology | HSMC     | 1              | 0        | 0         | 1         | 1         | 40         | 60 | 100 |
| <b>THEORY COURSES WITH LABORATORY COMPONENT</b> |             |  |          |                |          |           |           |           |            |    |     |
| 4   | 24MAI29     | Probability and Statistics                         | BSC      | 2              | 1        | 2         | 5         | 4         | 50         | 50 | 100 |
| 5   | 24PHI07     | Engineering Physics                                | BSC      | 3              | 0        | 2         | 5         | 4         | 50         | 50 | 100 |
| 6   | 24ECI26     | Digital Principles and System Design               | ESC      | 3              | 0        | 2         | 5         | 4         | 50         | 50 | 100 |
| <b>LABORATORY COURSES</b>                       |             |  |          |                |          |           |           |           |            |    |     |
| 7   | 24ENP29     | Professional Communication Laboratory              | HSMC     | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 8   | 24CSP29     | Python Programming Laboratory                      | PCC      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>         |             |  |          |                |          |           |           |           |            |    |     |
| 9   | 24SSP29     | Aptitude and Coding Skills-II                      | EEC      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| <b>MANDATORY COURSE</b>                         |             |  |          |                |          |           |           |           |            |    |     |
| 10  |             | Mandatory Course - I                               | MC       | 0              | 0        | 2         | 2         | 0         | -          | -  | -   |
| <b>TOTAL</b>                                    |             |  |          | <b>14</b>      | <b>1</b> | <b>14</b> | <b>29</b> | <b>21</b> | <b>900</b> |    |     |
| SEMESTER III                                    |             |  |          |                |          |           |           |           |            |    |     |
| S. No.  | Course Code | Course Title                                       | Category | Periods / Week |          |           |           | Credit    | Max. Marks |    |     |
|   |             |  |          | L              | T        | P         | Tot       |           | CA         | ES | Tot |
| <b>THEORY COURSES</b>                           |             |  |          |                |          |           |           |           |            |    |     |
| 1   | 24MAT37     | Discrete Mathematics                               | BSC      | 3              | 1        | 0         | 4         | 4         | 40         | 60 | 100 |
| 2   | 24CST36     | Data Structures and Algorithms                     | PCC      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 3   | 24CST37     | Java Programming                                   | PCC      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 4   | 24ECT37     | Micro Controller and Embedded Systems              | ESC      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| <b>THEORY COURSES WITH LABORATORY COMPONENT</b> |             |  |          |                |          |           |           |           |            |    |     |
| 5   | 24ITI32     | Operating systems                                  | PCC      | 3              | 0        | 2         | 5         | 4         | 50         | 50 | 100 |
| <b>LABORATORY COURSES</b>                       |             |  |          |                |          |           |           |           |            |    |     |
| 6   | 24CSP36     | Data structures and Algorithms Laboratory          | PCC      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 7   | 24CSP37     | Java Programming Laboratory                        | PCC      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 8   | 24ITP32     | Design Studio-I                                    | PCC      | 0              | 0        | 2         | 2         | 1         | 100        | -  | 100 |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>         |             |  |          |                |          |           |           |           |            |    |     |
| 9   | 24SSP39     | Aptitude and Coding Skills-III                     | EEC      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| <b>TOTAL</b>                                    |             |  |          | <b>15</b>      | <b>1</b> | <b>10</b> | <b>26</b> | <b>21</b> | <b>900</b> |    |     |

| SEMESTER IV  |             |  |          |                |          |          |           |           |             |    |     |
|--|-------------|--|----------|----------------|----------|----------|-----------|-----------|-------------|----|-----|
| S. No.   | Course Code | Course Title                           | Category | Periods / Week |          |          |           | Credit    | Max. Marks  |    |     |
|  |             |  |          | L              | T        | P        | Tot       |           | CA          | ES | Tot |
| <b>THEORY COURSES</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 1  | 24MAT46     | Linear Algebra and Numerical Methods   | BSC      | 3              | 1        | 0        | 4         | 4         | 40          | 60 | 100 |
| 2  | 24ITT46     | Database Management Systems            | PCC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 3  | 24ITT41     | Theory of Computation                  | PCC      | 3              | 1        | 0        | 4         | 4         | 40          | 60 | 100 |
| 4  | 24ITT42     | Algorithm Design and Analysis          | PCC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 5  | 24GET49     | Universal Human values                 | HSMC     | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 6  | 24ITT43     | Introduction to Data Science           | PCC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| <b>LABORATORY COURSES</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 7  | 24ITP46     | Database Management Systems Laboratory | PCC      | 0              | 0        | 2        | 2         | 1         | 60          | 40 | 100 |
| 8  | 24ITP43     | Data Science Laboratory                | PCC      | 0              | 0        | 2        | 2         | 1         | 60          | 40 | 100 |
| 9  | 24ITP44     | Design Studio-II                       | PCC      | 0              | 0        | 2        | 2         | 1         | 100         | -  | 100 |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 10   | 24SSP49     | Aptitude and Coding Skills-IV          | EEC      | 0              | 0        | 2        | 2         | 1         | 60          | 40 | 100 |
| <b>TOTAL</b>   |             |  |          | <b>18</b>      | <b>2</b> | <b>8</b> | <b>28</b> | <b>24</b> | <b>1000</b> |    |     |
| SEMESTER V   |             |  |          |                |          |          |           |           |             |    |     |
| S. No.   | Course Code | Course Title                           | Category | Periods / Week |          |          |           | Credit    | Max. Marks  |    |     |
|  |             |  |          | L              | T        | P        | Tot       |           | CA          | ES | Tot |
| <b>THEORY COURSES</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 1  | 24CST56     | Computer Networks                      | PCC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 2  | 24ITT51     | Software Engineering Methodology       | PCC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 3  | 24ITT52     | Web Technology                         | PCC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 4  |             | Professional Elective – I              | PEC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 5  |             | Professional Elective – II             | PEC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| 6  |             | Open Elective – I                      | OEC      | 3              | 0        | 0        | 3         | 3         | 40          | 60 | 100 |
| <b>LABORATORY COURSES</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 8  | 24CSP56     | Networks Laboratory                    | PCC      | 0              | 0        | 2        | 2         | 1         | 60          | 40 | 100 |
| 9  | 24ITP52     | Web Technology Laboratory              | PCC      | 0              | 0        | 2        | 2         | 1         | 60          | 40 | 100 |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 10   | 24ITP53     | Internship-I*                          | EEC      | 0              | 0        | 0        | 0         | 1         | 100         | -  | 100 |
| <b>MANDATORY COURSE</b>  |             |  |          |                |          |          |           |           |             |    |     |
| 11   |             | Mandatory Course - II                  | MC       | 2              | 0        | 0        | 2         | 0         | 100         | -  | 100 |
| <b>TOTAL</b>   |             |  |          | <b>20</b>      | <b>0</b> | <b>4</b> | <b>24</b> | <b>21</b> | <b>1000</b> |    |     |
| <b>*The Students Should Undergo Internship During The IV Semester Summer Vacation.</b> |             |  |          |                |          |          |           |           |             |    |     |

| SEMESTER VI  |             |   |          |                |          |           |           |            |             |    |     |
|--|-------------|---|----------|----------------|----------|-----------|-----------|------------|-------------|----|-----|
| S. No.   | Course Code | Course Title                              | Category | Periods / Week |          |           |           | Credit     | Max. Marks  |    |     |
|  |             |   |          | L              | T        | P         | Tot       |            | CA          | ES | Tot |
| <b>THEORY COURSES</b>  |             |   |          |                |          |           |           |            |             |    |     |
| 1  | 24ITT66     | Cryptography and Network Security         | PCC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 2  | 24ITT61     | Generative AI                             | PCC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 3  | 24ITT62     | Mobile Application Development            | PCC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 4  |             | Professional Elective – III               | PEC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 5  |             | Professional Elective – IV                | PEC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 6  |             | Open Elective – II                        | OEC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| <b>LABORATORY COURSE</b>   |             |   |          |                |          |           |           |            |             |    |     |
| 7  | 24ITP61     | Generative AI Laboratory                  | PCC      | 0              | 0        | 2         | 2         | 1          | 60          | 40 | 100 |
| 8  | 24ITP62     | Mobile Application Development laboratory | PCC      | 0              | 0        | 2         | 2         | 1          | 60          | 40 | 100 |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>  |             |   |          |                |          |           |           |            |             |    |     |
| 9  | 24ITP63     | Multidisciplinary Design Project          | EEC      | 0              | 0        | 4         | 4         | 2          | 60          | 40 | 100 |
| <b>MANDATORY COURSE</b>  |             |   |          |                |          |           |           |            |             |    |     |
| 10   |             | Mandatory Course - III                    | MC       | 2              | 0        | 0         | 2         | 0          | 100         | -  | 100 |
| <b>TOTAL</b>   |             |   |          | <b>20</b>      | <b>0</b> | <b>8</b>  | <b>28</b> | <b>22</b>  | <b>1000</b> |    |     |
| <b>SEMESTER VII</b>  |             |   |          |                |          |           |           |            |             |    |     |
| S. No.   | Course Code | Course Title                              | Category | Periods / Week |          |           |           | Credit     | Max. Marks  |    |     |
|  |             |   |          | L              | T        | P         | Tot       |            | CA          | ES | Tot |
| <b>THEORY COURSES</b>  |             |   |          |                |          |           |           |            |             |    |     |
| 1  | 24GET79     | Professional Ethics                       | HSMC     | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 2  |             | Management Elective                       | HSMC     | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 3  | 24ITT71     | Big Data Analytics                        | PCC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 4  |             | Professional Elective – V                 | PEC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 5  |             | Professional Elective – VI                | PEC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| 6  |             | Open Elective – III                       | OEC      | 3              | 0        | 0         | 3         | 3          | 40          | 60 | 100 |
| <b>LABORATORY COURSE</b>   |             |   |          |                |          |           |           |            |             |    |     |
| 7  | 24ITP71     | Big Data Analytics Laboratory             | PCC      | 0              | 0        | 2         | 2         | 1          | 60          | 40 | 100 |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>  |             |   |          |                |          |           |           |            |             |    |     |
| 8  | 24ITP72     | Project work Phase - I                    | EEC      | 0              | 0        | 4         | 4         | 2          | 60          | 40 | 100 |
| 9  | 24ITP73     | Internship-II*                            | EEC      | 0              | 0        | 0         | 0         | 1          | 100         | -  | 100 |
| <b>TOTAL</b>   |             |   |          | <b>18</b>      | <b>0</b> | <b>6</b>  | <b>24</b> | <b>22</b>  | <b>900</b>  |    |     |
| <b>*The Students Should Undergo Internship During The VI Semester Summer Vacation.</b>   |             |   |          |                |          |           |           |            |             |    |     |
| <b>SEMESTER VIII</b>   |             |   |          |                |          |           |           |            |             |    |     |
| S. No.   | Course Code | Course Title                              | Category | Periods / Week |          |           |           | Credit     | Max. Marks  |    |     |
|  |             |   |          | L              | T        | P         | Tot       |            | CA          | ES | Tot |
| <b>EMPLOYABILITY ENHANCEMENT COURSE</b>  |             |   |          |                |          |           |           |            |             |    |     |
| 1  | 24ITP81     | Project Work Phase – II                   | EEC      | 0              | 0        | 16        | 16        | 8          | 60          | 40 | 100 |
| <b>TOTAL</b>   |             |   |          | <b>0</b>       | <b>0</b> | <b>16</b> | <b>16</b> | <b>8</b>   | <b>100</b>  |    |     |
| <b>TOTAL CREDITS</b>   |             |   |          |                |          |           |           | <b>162</b> |             |    |     |
| <b>TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 162</b>  |             |   |          |                |          |           |           |            |             |    |     |
| <b>Note:</b> HSMC- Humanities and Social Sciences including Management courses, BSC - Basic Science Courses, ESC - Engineering Science Courses, PCC - Professional core courses, PEC- Professional Elective courses, OEC – Open Elective courses, EEC – Employability Enhancement Courses & MC- Mandatory courses. |             |   |          |                |          |           |           |            |             |    |     |


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|---|--------------------|--|-----------------|-----------------------|----------|----------|------------|---------------|---------------------------------------|-----------|------------|
| <b>Department</b>   |                    | <b>Department of Information Technology</b>  |                 |                       |          |          |            |               |                                       |           |            |
| <b>Programme</b>  |                    | <b>B.Tech. - Information Technology</b>  |                 |                       |          |          |            |               |                                       |           |            |
| <b>HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSES (HSMC)</b>                   |                    |  |                 |                       |          |          |            |               |                                       |           |            |
| <b>S. No.</b>   | <b>Course Code</b> | <b>Course Title</b>  | <b>Semester</b> | <b>Periods / Week</b> |          |          |            | <b>Credit</b> | <b>Max. Marks</b>                     |           |            |
|   |                    |  |                 | <b>L</b>              | <b>T</b> | <b>P</b> | <b>Tot</b> |               | <b>CA</b>                             | <b>ES</b> | <b>Tot</b> |
| 1   | 24ENT19            | Professional Communication   | I               | 3                     | 0        | 0        | 3          | 3             | 40                                    | 60        | 100        |
| 2   | 24GET19            | தமிழ்மரபு/Heritage of Tamils   | I               | 1                     | 0        | 0        | 1          | 1             | 40                                    | 60        | 100        |
| 3   | 24GET29            | தமிழ்ரும் தொழில் துட்பமும்/<br>Tamils and Technology   | II              | 1                     | 0        | 0        | 1          | 1             | 40                                    | 60        | 100        |
| 4   | 24ENP29            | Professional Communication<br>Laboratory   | II              | 0                     | 0        | 3        | 3          | 1             | 60                                    | 40        | 100        |
| 5   | 24GET49            | Universal Human values   | IV              | 3                     | 0        | 0        | 3          | 3             | 40                                    | 60        | 100        |
| 6.  | 24GET79            | Professional Ethics  | VII             | 3                     | 0        | 0        | 3          | 3             | 40                                    | 60        | 100        |
| 7   | 24MGT7X            | Management - Elective  | VII             | 3                     | 0        | 0        | 3          | 3             | 40                                    | 60        | 100        |
| <b>TOTAL</b>  |                    |  |                 | <b>14</b>             | <b>0</b> | <b>3</b> | <b>17</b>  | <b>15</b>     |                                       |           |            |
| <b>BASIC SCIENCE COURSES (BSC)</b>  |                    |  |                 |                       |          |          |            |               |                                       |           |            |
| <b>S. No.</b>   | <b>Course Code</b> | <b>Course Title</b>  | <b>Semester</b> | <b>Periods / Week</b> |          |          |            | <b>Credit</b> | <b>Max. Marks</b>                     |           |            |
|   |                    |  |                 | <b>L</b>              | <b>T</b> | <b>P</b> | <b>Tot</b> |               | <b>CA</b>                             | <b>ES</b> | <b>Tot</b> |
| 1   | 24MAI19            | Matrices and Calculus  | I               | 2                     | 1        | 2        | 5          | 4             | 50                                    | 50        | 100        |
| 2   | 24CHI06            | Chemistry for Engineers  | I               | 3                     | 0        | 2        | 5          | 4             | 50                                    | 50        | 100        |
| 3   | 24MAI26            | Probability and Statistics   | II              | 2                     | 1        | 2        | 5          | 4             | 50                                    | 50        | 100        |
| 4   | 24PHI06            | Engineering Physics  | II              | 3                     | 0        | 2        | 5          | 4             | 50                                    | 50        | 100        |
| 5   | 24MAT36            | Discrete Mathematics   | III             | 3                     | 1        | 0        | 4          | 4             | 40                                    | 60        | 100        |
| 6   | 24MAT46            | Numerical Methods  | IV              | 3                     | 1        | 0        | 4          | 4             | 40                                    | 60        | 100        |
| <b>TOTAL</b>  |                    |  |                 | <b>16</b>             | <b>4</b> | <b>8</b> | <b>28</b>  | <b>24</b>     |                                       |           |            |



| ENGINEERING SCIENCES COURSES (ESC)      |             |  |          |                |          |           |           |           |            |    |     |
|---|-------------|--|----------|----------------|----------|-----------|-----------|-----------|------------|----|-----|
| S. No.                                  | Course Code | Course Title                                     | Semester | Periods / Week |          |           |           | Credit    | Max. Marks |    |     |
|   |             |  |          | L              | T        | P         | Tot       |           | CA         | ES | Tot |
| 1                                       | 24EET06     | Basics of Electrical and Electronics Engineering | I        | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 2                                       | 24ITT16     | Programming for Problem Solving                  | I        | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 3                                       | 24ITP16     | Programming for Problem Solving Laboratory       | I        | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 4                                       | 24MEP06     | Engineering Graphics Laboratory                  | I        | 1              | 0        | 2         | 3         | 2         | 60         | 40 | 100 |
| 6                                       | 24GEP16     | Engineering Experience Laboratory                | I        | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 7                                       | 24ECI26     | Digital Principles and System Design             | II       | 3              | 1        | 0         | 4         | 4         | 50         | 50 | 100 |
| 8                                       | 24ECT37     | Micro Controller and Embedded Systems            | III      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| <b>TOTAL</b>                            |             |  |          | <b>13</b>      | <b>1</b> | <b>6</b>  | <b>20</b> | <b>17</b> |            |    |     |
| EMPLOYABILITY ENHANCEMENT COURSES (EEC) |             |  |          |                |          |           |           |           |            |    |     |
| S. No.                                  | Course Code | Course Title                                     | Semester | Periods / Week |          |           |           | Credit    | Max. Marks |    |     |
|   |             |  |          | L              | T        | P         | Tot       |           | CA         | ES | Tot |
| 1                                       | 24SSP19     | Aptitude and Coding Skills-I                     | I        | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 2                                       | 24SSP29     | Aptitude and Coding Skills-II                    | II       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 3                                       | 24SSP39     | Aptitude and Coding Skills-III                   | III      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 4                                       | 24SSP49     | Aptitude and Coding Skills-IV                    | IV       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 5                                       | 24ITP52     | Internship – I                                   | V        | 0              | 0        | 0         | 0         | 1         | 100        | -  | 100 |
| 6                                       | 24ITP66     | Multidisciplinary Design Project                 | VI       | 0              | 0        | 4         | 4         | 2         | 60         | 40 | 100 |
|   | 24ITP72     | Project Work Phase – I                           | VII      | 0              | 0        | 4         | 4         | 2         | 60         | 40 | 100 |
| 7                                       | 24ITP73     | Internship – II                                  | VII      | 0              | 0        | 0         | 0         | 1         | 100        | -  | 100 |
| 8                                       | 24ITP81     | Project Work Phase – II                          | VIII     | 0              | 0        | 16        | 16        | 8         | 60         | 40 | 100 |
| <b>TOTAL</b>                            |             |  |          | <b>0</b>       | <b>0</b> | <b>32</b> | <b>32</b> | <b>18</b> |            |    |     |

| PROFESSIONAL CORE COURSES (PCC) |             |   |          |                |          |           |           |           |            |    |     |
|---------------------------------|-------------|---|----------|----------------|----------|-----------|-----------|-----------|------------|----|-----|
| S. No.                          | Course Code | Course Title                              | Semester | Periods / Week |          |           |           | Credit    | Max. Marks |    |     |
|                                 |             |   |          | L              | T        | P         | Tot       |           | CA         | ES | Tot |
| 1                               | 24CST29     | Python Programming                        | II       | 3              | 0        | 3         | 3         | 3         | 40         | 60 | 100 |
| 2                               | 24CSP29     | Python Programming Laboratory             | II       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 3                               | 24CST36     | Data Structures and Algorithms            | III      | 3              | 0        | 3         | 3         | 3         | 40         | 60 | 100 |
| 4                               | 24CSP36     | Data Structures and Algorithms Laboratory | III      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 5                               | 24CST21     | Design Thinking                           | II       | 2              | 0        | 0         | 2         | 2         | 40         | 60 | 100 |
| 6                               | 24CST37     | Java Programming                          | III      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 7                               | 24ITI32     | Operating systems                         | III      | 3              | 0        | 2         | 5         | 4         | 50         | 50 | 100 |
| 8                               | 24CSP37     | Java Programming Laboratory               | III      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 9                               | 24ITP32     | Design Studio-I                           | III      | 0              | 0        | 2         | 2         | 1         | 100        | -  | 100 |
| 10                              | 24ITT46     | Database Management Systems               | IV       | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 11                              | 24ITT41     | Theory of Computation                     | IV       | 3              | 1        | 0         | 3         | 4         | 40         | 60 | 100 |
| 12                              | 24ITT42     | Algorithm Design & Analysis               | IV       | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 13                              | 24ITT43     | Introduction to Data Science              | IV       | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 14                              | 24ITP46     | Database Management Systems Laboratory    | IV       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 15                              | 24ITP43     | Data Science Laboratory                   | IV       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 16                              | 24ITP44     | Design Studio-II                          | IV       | 0              | 0        | 2         | 2         | 1         | 100        | -  | 100 |
| 17                              | 24CST56     | Computer Networks                         | V        | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 18                              | 24ITT52     | Software Engineering Methodology          | V        | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 19                              | 24ITT53     | Web Technology                            | V        | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 20                              | 24CSP56     | Networks Laboratory                       | V        | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 21                              | 24ITP53     | Web Technology Laboratory                 | V        | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 22                              | 24ITT66     | Cryptography and Network Security         | VI       | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 23                              | 24ITT62     | Generative AI                             | VI       | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 24                              | 24ITT63     | Mobile Application Development            | VI       | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 25                              | 24ITP62     | Generative AI Laboratory                  | VI       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 26                              | 24ITP63     | Mobile Application Development Laboratory | VI       | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| 27                              | 24ITT71     | Big Data Analytics                        | VII      | 3              | 0        | 0         | 3         | 3         | 40         | 60 | 100 |
| 28                              | 24ITP71     | Big Data Analytics Laboratory             | VII      | 0              | 0        | 2         | 2         | 1         | 60         | 40 | 100 |
| <b>TOTAL</b>                    |             |   |          | <b>47</b>      | <b>1</b> | <b>32</b> | <b>73</b> | <b>61</b> |            |    |     |

| <b>PROFESSIONAL ELECTIVE COURSES (PEC) :VERTICALS</b> |                                     |                                       |                                      |  |   |
|---|-------------------------------------|---------------------------------------|--------------------------------------|--|---|
| <b>VERTICAL-1</b>                                     | <b>VERTICAL-2</b>                   | <b>VERTICAL-3</b>                     | <b>VERTICAL-4</b>                    | <b>VERTICAL-5</b>                            | <b>VERTICAL-6</b>                           |
| <b>Data Science</b>                                   | <b>Full Stack Development</b>       | <b>Emerging Technologies</b>          | <b>AI &amp; ML</b>                   | <b>Cyber Security and Data Privacy</b>       | <b>Integrated Technologies</b>              |
| Data Warehousing and Data Mining                      | Fundamentals of DevOps              | UI and UX Design                      | Neural Networks and Deep Learning    | System Security                              | IoT with Raspberry Pi                       |
| Distributed Computing                                 | Mobile Computing                    | Augmented Reality/Virtual Reality     | Knowledge Engineering                | Cyber threat intelligence                    | Social Network Analysis                     |
| Green Computing                                       | R Programming                       | Computer Graphics for Virtual Reality | Computer Vision                      | Ethical Hacking                              | Cloud Computing and Technologies            |
| Business Intelligence                                 | Software Testing and Automation     | Introduction to Robotics              | Game Theory and Mechanism Design     | Crypto-Currency and Block chain Technologies | Cyber security                              |
| Data Modelling  | Full Stack framework                | Web Services and API Design           | Robotics and Artificial Intelligence | Digital and Mobile Forensics                 | Digital Marketing                           |
| Exploratory Data Analysis                             | Drone Technology                    | Programming Mobile Devices            | Text and Speech Analysis             | Security and Privacy in Cloud                | Tele Communication and Switching Techniques |
| Quantum Computing                                     | Agile software development          | Modern Web Application Development    | Machine learning with Python         | Firewalls and Intrusion Detection System     | Smart Convergent Technologies               |
| Scientific and Engineering Data Visualization         | Object oriented analysis and design | Android Application Development       | Genetic Algorithms                   | Secure Software Engineering                  | Deep Learning for Vision                    |

|  |             | <b>K. S. R COLLEGE OF ENGINEERING</b><br>An Autonomous Institution<br>Approved by AICTE and Affiliated to Anna University, Chennai<br>Accredited by NAAC ('A++' Grade) |          |                |   |   |     |        | <b>Curriculum</b><br><b>UG</b><br><b>R - 2024</b> |    |     |
|---|-------------|--|----------|----------------|---|---|-----|--------|---|----|-----|
| Department  |             | Department of Information Technology   |          |                |   |   |     |        |   |    |     |
| Programme   |             | B.Tech. - Information Technology   |          |                |   |   |     |        |   |    |     |
| S. No.  | Course Code | Course Title   | Category | Periods / Week |   |   |     | Credit | Max. Marks  |    |     |
|   |             |  |          | L              | T | P | Tot |        | CA  | ES | Tot |
| <b>VERTICAL 1: DATA SCIENCE</b>   |             |  |          |                |   |   |     |        |   |    |     |
| 1   | 24IOE01     | Data Warehousing and Data Mining   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 2   | 24IOE02     | Distributed Computing  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 3   | 24ITE17     | Green Computing  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 4   | 24IOE04     | Business Intelligence  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 5   | 24IOE05     | Data Modelling   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 6   | 24IOE06     | Exploratory Data Analysis  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 7   | 24IOE07     | Quantum Computing  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 8   | 24IOE08     | Scientific and Engineering Data Visualization  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| <b>VERTICAL 2: FULL STACK DEVELOPMENT</b>   |             |  |          |                |   |   |     |        |   |    |     |
| 1   | 24CSE05     | Fundamentals of DevOps   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 2   | 24CSE06     | Mobile Computing   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 3   | 24CSE07     | C# and .Net Framework  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 4   | 24CSE08     | Software Testing and Automation  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 5   | 24CSE09     | Full Stack Framework   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 6   | 24CSE10     | Open Source Technologies   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 7   | 24CSE11     | Agile software development   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 8   | 24CSE12     | Object oriented analysis and design  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| <b>VERTICAL 3: EMERGING TECHNOLOGIES</b>  |             |  |          |                |   |   |     |        |   |    |     |
| 1   | 24CDE01     | UI and UX Design   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 2   | 24CDE02     | Augmented Reality/Virtual Reality  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 3   | 24CDE03     | Computer Graphics for Virtual Reality  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 4   | 24CDE04     | Introduction to Robotics   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 5   | 24ITE18     | Web Services and API Design  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 6   | 24CDE06     | Programming Mobile Devices   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 7   | 24CDE07     | Modern Web Application Development   | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |
| 8   | 24CDE08     | Android Application Development  | PEC      | 3              | 0 | 0 | 3   | 3      | 40  | 60 | 100 |

| VERTICAL 4: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING |             |  |          |                |   |   |     |        |            |    |     |
|--|-------------|--|----------|----------------|---|---|-----|--------|------------|----|-----|
| 1  | 24ITE01     | Neural Networks and Deep Learning            | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 2  | 24ITE02     | Knowledge Engineering                        | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 3  | 24ITE03     | Computer Vision                              | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 4  | 24ITE04     | Game Theory and Mechanism Design             | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 5  | 24ITE05     | Robotics and Artificial Intelligence         | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 6  | 24ITE06     | Text and Speech Analysis                     | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 7  | 24ITE07     | Machine learning with Python                 | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 8  | 24ITE08     | Genetic Algorithms                           | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| VERTICAL 5: CYBER SECURITY AND DATA PRIVACY              |             |  |          |                |   |   |     |        |            |    |     |
| 1  | 24CBE01     | Social Engineering Security                  | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 2  | 24CBE02     | Cyber threat intelligence                    | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 3  | 24ITE19     | Ethical hacking                              | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 4  | 24CBE04     | Crypto-Currency and Block chain Technologies | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 5  | 24CBE05     | Digital and Mobile Forensics                 | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 6  | 24CBE06     | Security and Privacy in Cloud.               | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 7  | 24CBE07     | Firewalls and Intrusion Detection System     | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 8  | 24CBE08     | Secure Software Engineering                  | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| VERTICAL 6: INTEGRATED TECHNOLOGIES                      |             |  |          |                |   |   |     |        |            |    |     |
| S. No.   | Course Code | Course Title                                 | Category | Periods / Week |   |   |     | Credit | Max. Marks |    |     |
|  |             |  |          | L              | T | P | Tot |        | CA         | ES | Tot |
| 1  | 24ITE09     | IoT with Raspberry Pi                        | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 2  | 24ITE10     | Social Network Analysis                      | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 3  | 24ITE11     | Cloud Computing and Technologies             | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 4  | 24ITE12     | Cyber security                               | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 5  | 24ITE13     | Digital Marketing                            | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 6  | 24ITE14     | Tele Communication and Switching Techniques  | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 7  | 24ITE15     | Smart Convergent Technologies                | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 8  | 24ITE16     | Deep Learning for Vision                     | PEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |

| <b>MANAGEMENT ELECTIVES</b>          |         |  |      |   |   |   |   |          |     |    |     |
|--------------------------------------|---------|--|------|---|---|---|---|----------|-----|----|-----|
| 1                                    | 24MGT01 | Total Quality Management                       | HSMC | 3 | 0 | 0 | 3 | <b>3</b> | 40  | 60 | 100 |
| 2                                    | 24MGT02 | Principles of Management                       | HSMC | 3 | 0 | 0 | 3 | <b>3</b> | 40  | 60 | 100 |
| 3                                    | 24MGT03 | Engineering Economics and Financial Accounting | HSMC | 3 | 0 | 0 | 3 | <b>3</b> | 40  | 60 | 100 |
| 4                                    | 24MGT04 | Human Resource Management                      | HSMC | 3 | 0 | 0 | 3 | <b>3</b> | 40  | 60 | 100 |
| 5                                    | 24MGT05 | Industrial Management                          | HSMC | 3 | 0 | 0 | 3 | <b>3</b> | 40  | 60 | 100 |
| <b>MANDATORY COURSE-I,II&amp;III</b> |         |  |      |   |   |   |   |          |     |    |     |
| 1                                    | 24MCP09 | Yoga for Stress Management                     | MC   | 0 | 0 | 2 | 2 | <b>0</b> | -   | -  | -   |
| 2                                    | 24MCT01 | Constitution of India                          | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 3                                    | 24MCT02 | Environmental Science and Sustainability       | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 4                                    | 24MCT03 | Introduction to Gender Studies                 | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 5                                    | 24MCT04 | Life Science for Engineers                     | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 6                                    | 24MCT05 | Industrial Safety                              | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 7                                    | 24MCT06 | Essence of Indian Knowledge System             | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 8                                    | 24MCT07 | Elements of Literature                         | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |
| 9                                    | 24MCT08 | Disaster Management                            | MC   | 2 | 0 | 0 | 2 | <b>0</b> | 100 | -  | 100 |

**OPEN ELECTIVE COURSES**  
**OPEN ELECTIVE COURSES OFFERED BY OTHER BRANCHES**

| S. No. | Course Code | Course Title                            | Category | Periods / Week |   |   |     | Credit | Max. Marks |    |     |
|--------|-------------|---|----------|----------------|---|---|-----|--------|------------|----|-----|
|        |             |   |          | L              | T | P | Tot |        | CA         | ES | Tot |
| 1      | 24AU001     | Basics of Automobile Engineering        | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 2      | 24AU002     | Automotive Engine Technology            | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 3      | 24AU003     | Automotive Vehicle Technology           | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 4      | 24AU004     | Automotive Safety                       | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 5      | 24AU005     | Hybrid Vehicles                         | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 6      | 24AU006     | Off Highway Vehicles                    | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 7      | 24AU007     | Modern and Intelligent Vehicle System   | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 8      | 24AU008     | Vehicle Maintenance                     | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 9      | 24BMO01     | Basics of Biomedical Instrumentation    | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 10     | 24BMO02     | Imaging Equipments                      | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 11     | 24BMO03     | Biometric systems                       | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 12     | 24BMO04     | Human Assist Devices                    | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 13     | 24BMO05     | Medical Informatics                     | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 14     | 24BMO06     | Medical Innovation and Entrepreneurship | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 15     | 24CEO01     | Architecture Heritage of India          | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 16     | 24CEO02     | Elementary Civil Engineering            | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 17     | 24CEO03     | Modern Construction Materials           | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 18     | 24CEO04     | Water and Air Pollution Management      | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 19     | 24CEO05     | Water Harvesting and Management         | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 20     | 24CDO01     | Animation Basics                        | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 21     | 24CDO02     | Data Visualization Techniques           | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 22     | 24CSO01     | Programming in Java                     | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 23     | 24CSO02     | Fundamentals of Operating Systems       | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 24     | 24CSO03     | Fundamentals of Database Systems        | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |
| 25     | 24CSO04     | Internet Programming                    | OEC      | 3              | 0 | 0 | 3   | 3      | 40         | 60 | 100 |

|    |         |  |     |   |   |   |   |          |    |    |     |
|----|---------|--|-----|---|---|---|---|----------|----|----|-----|
| 26 | 24CSO05 | Artificial Intelligence and Machine Learning     | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 27 | 24IOO01 | Internet of Thing and its Applications           | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 28 | 24IOO02 | Sensors and Actuator Devices                     | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 29 | 24IOO03 | Mobile Application Development                   | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 30 | 24CBO01 | Fundamentals of Cyber security                   | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 31 | 24CBO02 | Penetration and Vulnerability Testing Techniques | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 32 | 24CBO03 | Basics of Digital Forensics                      | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 33 | 24CBO04 | Introduction to Ethical Hacking                  | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 34 | 24CBO05 | Malware analysis                                 | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 35 | 24EEO01 | Electrical Drives and Control                    | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 36 | 24EEO02 | Electrical Power Generation Systems              | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 37 | 24EEO03 | Industrial Automation                            | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 38 | 24EEO04 | Electrical Instruments and Measurements          | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 39 | 24EEO05 | Energy Conservation and Management               | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 40 | 24EEO06 | Electrical Wiring, Estimation and Costing        | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 41 | 24EEO07 | Fundamentals of Electrical Machinery             | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 42 | 24EEO08 | Fundamentals of Electric Vehicle                 | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 43 | 24ECO01 | Consumer Electronics                             | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 44 | 24ECO02 | NANO Technology                                  | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 45 | 24ECO03 | Fundamentals of Robotics                         | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 46 | 24ECO04 | Principles of Communication                      | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 47 | 24ECO05 | Electronics and Microprocessor                   | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 48 | 24ITO01 | Block chain Technologies                         | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 49 | 24ITO02 | Cyber security Fundamentals                      | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 50 | 24ITO03 | Cloud computing Techniques                       | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 51 | 24ITO04 | Data Science using R                             | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 52 | 24ITO05 | Fundamentals of Business Intelligence            | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 53 | 24MEO01 | Basic Mechanical Engineering                     | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 54 | 24MEO02 | Solar Energy Utilization                         | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |



|    |         |                                 |     |   |   |   |   |          |    |    |     |
|----|---------|---------------------------------|-----|---|---|---|---|----------|----|----|-----|
| 55 | 24MEO03 | Selection of Materials          | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 56 | 24MEO04 | Fibre Reinforced Plastics       | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 57 | 24MEO05 | Rapid Prototyping               | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 58 | 24SFO01 | Occupational health and hygiene | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 59 | 24SFO02 | Construction safety             | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 60 | 24SFO03 | Building fire safety            | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 61 | 24SFO04 | Legal aspects of safety         | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |
| 62 | 24SFO05 | Safety measures for engineers   | OEC | 3 | 0 | 0 | 3 | <b>3</b> | 40 | 60 | 100 |

| Summary  |           |           |           |           |           |           |           |          |               |              |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|---------------|--------------|
| Name of the Programme: B.Tech.- Information Technology |           |           |           |           |           |           |           |          |               |              |
| CATEGORY   | I         | II        | III       | IV        | V         | VI        | VII       | VIII     | TOTAL CREDITS | %            |
| HSMC   | 4         | 2         | -         | 3         | -         | -         | 6         | -        | <b>15</b>     | <b>9.2</b>   |
| BSC  | 8         | 8         | 4         | 4         | -         | -         | -         | -        | <b>24</b>     | <b>14.8</b>  |
| ESC  | 10        | 4         | 3         | -         | -         | -         | -         | -        | <b>17</b>     | <b>10.49</b> |
| PCC  | -         | 6         | 13        | 16        | 11        | 11        | 4         | -        | <b>61</b>     | <b>37.65</b> |
| PEC  | -         | -         | -         | -         | 6         | 6         | 6         | -        | <b>18</b>     | <b>11.1</b>  |
| OEC  | -         | -         | -         | -         | 3         | 3         | 3         | -        | <b>9</b>      | <b>5.5</b>   |
| EEC  | 1         | 1         | 1         | 1         | 1         | 2         | 3         | 8        | <b>18</b>     | <b>11.0</b>  |
| MC   | -         | ✓         | -         | -         | ✓         | ✓         | -         | -        | -             | -            |
| <b>Total</b>   | <b>23</b> | <b>21</b> | <b>21</b> | <b>23</b> | <b>21</b> | <b>22</b> | <b>22</b> | <b>8</b> | <b>162</b>    | <b>100</b>   |

| 24ENT19   | PROFESSIONAL COMMUNICATION                     | Category | L | T | P | C          |
|---|--|----------|---|---|---|------------|
|   |  | HSMC     | 3 | 0 | 0 | 3          |
| <b>(Common to All Branches)</b>   |  |          |   |   |   |            |
| <b>PREREQUISITE:</b><br>A comprehensive understanding of basic English grammar, vocabulary, and sentence structure with familiarity in Business Communication and Technical Writing are considered as pre-requisites for the course.  |  |          |   |   |   |            |
| <b>OBJECTIVES:</b>  |  |          |   |   |   |            |
| <ul style="list-style-type: none"> <li>• To enable learners to compare and contrast the ideas/products in a technical context</li> <li>• To make learners to critically evaluate the written text and write report and paragraphs</li> <li>• To facilitate learners' problem based writing and to enable them describe the process/product</li> <li>• To enable learners to interpret the graphical representation in order to prepare extensive descriptions</li> <li>• To prepare the learners to draft effective SOP/Resume for job/internships</li> </ul> |  |          |   |   |   |            |
| <b>UNIT - I</b>   | <b>UNDERSTANDING COMPARISONS AND CONTRASTS</b> |          |   |   |   | <b>(9)</b> |
| <b>Reading-</b> Reading brochures (technical context), telephone messages/ social media messages relevant to technical contexts and emails. <b>Writing-</b> Writing emails/letters introducing oneself, - Compare and Contrast Essay. <b>Grammar</b> –Present Tenses, - Question types: WH /Yes or No/and Tags. <b>Vocabulary</b> - Synonyms; One-word substitution; Abbreviations &Acronyms (as used in technical contexts).   |  |          |   |   |   |            |
| <b>UNIT - II</b>  | <b>WRITING REPORTS AND PARAGRAPHS</b>          |          |   |   |   | <b>(9)</b> |
| <b>Reading-</b> Reading longer technical texts, biographies, travelogues, newspaper reports, Excerpts from literature, and travel &technical blogs, <b>Writing-</b> Paragraph writing, Short Report on an event (industrial visit) <b>Grammar</b> –Active-Passive Voice transformations, Infinitive and Gerunds, Past Tenses -Subject-Verb Agreement; Prepositions. <b>Vocabulary-</b> Word formations (Prefixes &Suffixes); portmanteau words and Antonyms.  |  |          |   |   |   |            |
| <b>UNIT - III</b>   | <b>DESCRIBING THE PROCESS/PRODUCT</b>          |          |   |   |   | <b>(9)</b> |
| <b>Reading-</b> Advertisements, gadget reviews; user manuals, case studies, excerpts from literary texts, news reports etc. <b>Writing</b> – Definitions; Instructions; Product/Process description, Checklists, Problem solution essay/Argumentative Essay. <b>Grammar</b> –Future Tenses; If conditional clauses. <b>Vocabulary</b> – Nominal Compounds, Homonyms and Homophones, Discourse Markers (connectives &sequence words).  |  |          |   |   |   |            |
| <b>UNIT - IV</b>  | <b>TRANSCODING AND RECOMMENDATIONS</b>         |          |   |   |   | <b>(9)</b> |
| <b>Reading</b> –Newspaper articles, Journal reports–and Non verbal Communication (tables, pie charts etc.); <b>Writing</b> – Recommendations, Note-making, Transcoding <b>Grammar</b> –Articles; Relative pronouns, Modals <b>Vocabulary</b> –Collocations and phrasal verbs.   |  |          |   |   |   |            |
| <b>UNIT - V</b>   | <b>SUMMATION AND DESCRIPTION</b>               |          |   |   |   | <b>(9)</b> |
| <b>Reading</b> –Reading editorials; and Opinion Blogs, Company profiles, Statement of Purpose (SOP); <b>Writing</b> –Essay Writing(Descriptive or Narrative), Job/Internship Application–Cover letter &Resume; <b>Grammar</b> –Numerical adjectives, Relative Clauses, <b>Vocabulary</b> -Cause &Effect Expressions–Content Vs Function words.  |  |          |   |   |   |            |
| <b>TOTAL: 45 PERIODS</b>  |  |          |   |   |   |            |

**COURSE OUTCOMES:****At the end of the course, the learners will be able to:**

| COs | Course Outcome  | Cognitive Level |
|-----|---|-----------------|
| CO1 | Compare and contrast products and ideas in technical texts.   | Analyse         |
| CO2 | Interpret and comprehend the given texts and writing reports/paragraphs                                 | Understand      |
| CO3 | Analyze problems in order to arrive at feasible solutions and describe the product/process effectively. | Analyse         |
| CO4 | Report events based on the Graphical representation and provide recommendations                         | Analyse         |
| CO5 | Draft effective resume's for job/internships  | Apply           |

**TEXT BOOKS:**

- 1 English for Engineers & Technologists, First edition, Orient Blackswan Private Ltd. Department of English, Anna University, 2020.
- 2 Dr.KN. Shoba, and Dr.Lourdes Joevani, English for Science & Technology Cambridge University Press, Francis Department of English, Anna University, 2021.

**REFERENCES:**

- 1 Meenakshi Raman, Sangeeta Sharm, Technical Communication– Principles and Practices, Oxford University .Press, New Delhi, 2016.
- 2 Lakshminarayanan, A CourseBook On Technical English, Scitech Publications (India) Pvt.Ltd, 2012.
- 3 Aysha Viswamohan, English For Technical Communication, McGraw Hill Education, 2008.
- 4 Kulbhusan Kumar, RSSalaria, Effective Communication Skill, Khanna Publishing House, 2018.
- 5 Dr.V.Chellammal, Learning to Communicate–Allied Publishing House, New Delhi, 2003.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | -   | -   | -   | -   | -   | -   | -   | 2   | 3   | -    | 3    | -    | -    |
| CO2         | -   | -   | -   | -   | -   | -   | -   | 2   | 3   | -    | 3    | -    | -    |
| CO3         | -   | -   | -   | -   | -   | -   | -   | 2   | 3   | -    | 3    | -    | -    |
| CO4         | -   | -   | -   | -   | -   | -   | -   | 2   | 3   | -    | 3    | -    | -    |
| CO5         | -   | -   | -   | -   | -   | -   | -   | 2   | 3   | -    | 3    | -    | -    |
| Avg.        | -   | -   | -   | -   | -   | -   | -   | 2   | 3   | -    | 3    | -    | -    |

1-low, 2-medium, 3-high

| 24EET06   | BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING | Category   | L | T | P | C |
|---|--|------------|---|---|---|---|
|   |  | ESC        | 3 | 0 | 0 | 3 |
| (Common to BM, CB, CD, CE, CS, IO, IT, ME, SF)  |  |            |   |   |   |   |
| <p><b>PREREQUISITE:</b></p> <p>Knowledge of mathematics, particularly differential equations, trigonometry, and basic calculus are required. A solid foundation in physics, especially in areas like electromagnetism and mechanics, is also important. Basic problem-solving skills are essential, as it helps to analyze circuits and understand electronic components.</p>   |  |            |   |   |   |   |
| <p><b>OBJECTIVES:</b></p> <ul style="list-style-type: none"> <li>To understand the basic definitions and principles governing DC and AC circuits.</li> <li>To gain knowledge of the construction, working principles, and applications of DC machines, induction motors, and transformers.</li> <li>To recognize the classification of wiring systems, earthing techniques, and the functioning of UPS systems.</li> <li>To realize the operation and characteristics of semiconductor devices and their applications.</li> <li>To impart the fundamentals of digital logic circuits and Arduino components.</li> </ul> |  |            |   |   |   |   |
| <b>UNIT - I</b>   | <b>DC AND AC CIRCUITS</b>                        | <b>(9)</b> |   |   |   |   |
| <p><b>DC circuits:</b> Electrical quantities – Ohm's law – Kirchhoff's current and voltage laws – Series and parallel resistors – Simple problems.</p> <p><b>AC circuits:</b> Waveforms, average value, RMS value, form factor, peak factor, power and power factor – Pure R, L and C – Series RL and RC circuits.</p>  |  |            |   |   |   |   |
| <b>UNIT - II</b>  | <b>ELECTRICAL MACHINES</b>                       | <b>(9)</b> |   |   |   |   |
| <p>DC machine: construction, working principle and applications – Single phase induction motor: Capacitor start capacitor run induction motor – Three phase induction motor: construction and working principle – Single phase transformer: construction and working principle.</p>   |  |            |   |   |   |   |
| <b>UNIT - III</b>   | <b>ELECTRICAL INSTALLATIONS</b>                  | <b>(9)</b> |   |   |   |   |
| <p>Classification of wiring system – Earthing – Types: pipe earthing, plate earthing, strip earthing – On-line and Off-line UPS – Lamps: Fluorescent tube, LED.</p>   |  |            |   |   |   |   |
| <b>UNIT - IV</b>  | <b>ANALOG ELECTRONICS</b>                        | <b>(9)</b> |   |   |   |   |
| <p>PN junction diode and Zener diode: Principle of operation and V-I characteristics – Half and full wave rectifier– Bipolar Junction Transistor: Construction and working.</p>   |  |            |   |   |   |   |
| <b>UNIT - V</b>   | <b>DIGITAL ELECTRONICS</b>                       | <b>(9)</b> |   |   |   |   |
| <p>Digital logic gates: NOT, AND, OR, NAND, NOR, EXOR – Digital circuits: half-adder, full-adder, JK and D flip flop – Introduction to Arduino components and IDE.</p>  |  |            |   |   |   |   |
| <b>Total : 45 PERIODS</b>   |  |            |   |   |   |   |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome   | Cognitive Level |
|-----|--|-----------------|
| CO1 | Interpret the fundamental concepts of electrical circuits to solve the DC and AC circuit problems.   | Understand      |
| CO2 | Elaborate the construction and working principles of DC machines, induction motors and transformers. | Understand      |
| CO3 | Describe the wiring systems, earthing techniques and the functionality of UPS and lighting systems.  | Understand      |
| CO4 | Identify the operation and characteristics of PN junction, Zener diode and BJT.                      | Understand      |
| CO5 | Illustrate the functionality of digital logic gates, adders, flip-flops and Arduino components.      | Understand      |

**TEXT BOOKS:**

- 1 Kothari D.P and Nagrath I.J, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill, Uttar Pradesh, 2020.
- 2 Bhattacharya S.K, "Basic Electrical and Electronics Engineering", Pearson Education, Delhi, Second Edition, 2017.

**REFERENCES:**

- 1 Jain V.K, Amitabh Bajaj, "Design of Electrical installation", University Science Press, New Delhi, 2016.
- 2 Ramamoorthy M, Chandra Sekhar O, "Electrical Machines", PHI Learning Pvt. Ltd, Delhi, 2018.
- 3 Christopher Siu, "Electronic Devices, Circuits, and Applications", Springer International Publishing, 2022.
- 4 Kothari D.P, Dhillon J.S, "Digital Circuits & Design", First Edition, Pearson, Delhi, 2015.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    | -    |
| CO2         | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    | -    |
| CO3         | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    | -    |
| CO4         | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    | -    |
| CO5         | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    | -    |
| Avg.        | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    | -    |

1-low, 2-medium, 3-high

| 24ITT16   | PROGRAMMING FOR PROBLEM SOLVING        | Category | L | T | P | C          |
|---|--|----------|---|---|---|------------|
|   |  | ESC      | 3 | 0 | 0 | 3          |
| <b>(Common to AUTO, BME,CSE, CS, CSD, IOT, IT ,ECE, EEE. MECH)</b>  |  |          |   |   |   |            |
| <b>PREREQUISITE:</b><br>Students must have basic computer literacy, including familiarity with operating systems, file management, and software usage. A Basic understanding of algorithms and flowcharts are required to design and visualize problem-solving strategies. Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills. |  |          |   |   |   |            |
| <b>OBJECTIVES:</b><br><ul style="list-style-type: none"> <li>•To acquire knowledge on hardware, software and computer languages.</li> <li>• To recall and implement the fundamentals concepts in C program.</li> <li>• To assimilate Arrays and Functions.</li> <li>• To get insight on Strings and Pointers.</li> <li>• To explore the importance of Structures and Files.</li> </ul>  |  |          |   |   |   |            |
| <b>UNIT - I</b>   | <b>INTRODUCTION TO COMPUTING AND C</b> |          |   |   |   | <b>(9)</b> |
| Introduction to Computing: Organization of computer – hardware and software – number system and conversions – representation of an algorithm: pseudo code, flowchart with examples. Introduction to C – features of C – structure of C program – character set – C tokens – keywords – identifiers – constants – variables – data types – operators – precedence and associativity.   |  |          |   |   |   |            |
| <b>UNIT - II</b>  | <b>CONTROL STRUCTURES</b>              |          |   |   |   | <b>(9)</b> |
| Decision Making and Branching: Introduction – decision making with if statement – simple if statement – if-else statement – nested if-else statements – if-else-if ladder statement – switch statement – goto statement – conditional operator – decision making and looping: introduction – while statement – do-while statement – for statement.  |  |          |   |   |   |            |
| <b>UNIT - III</b>   | <b>FUNCTIONS AND ARRAY</b>             |          |   |   |   | <b>(9)</b> |
| Functions: Declaration and definition – function prototype – parameter and arguments – return type – passing argument by value and by reference – function scope and lifetime – function pointer – arrays: array declaration and initialization – one dimensional array and two dimensional array with example.   |  |          |   |   |   |            |
| <b>UNIT - IV</b>  | <b>POINTERS AND STRINGS</b>            |          |   |   |   | <b>(9)</b> |
| Pointers: Definition – initialization – pointers arithmetic – pointers to pointers – pointers and arrays. String: Declaring and initializing string variables – string handling functions and operations.   |  |          |   |   |   |            |
| <b>UNIT - V</b>   | <b>STRUCTURE, UNION AND FILE</b>       |          |   |   |   | <b>(9)</b> |
| Structures: Declaration – definition – structure within a structure – union – storage classes – preprocessor directives – Files: Defining and opening a file – closing a file – input/output operations on files – command line arguments.  |  |          |   |   |   |            |
| <b>TOTAL: 45 PERIODS</b>  |  |          |   |   |   |            |

**COURSE OUTCOMES:****At the end of the course, the learners will be able to:**

| COs | Course Outcome  | Cognitive Level |
|-----|---|-----------------|
| CO1 | Identify and describe the fundamental components of computer systems and programming in C.                      | Understand      |
| CO2 | Infer the concepts of basic structures in control statements.   | Understand      |
| CO3 | Imbibe the concepts of arrays and functions to effectively manage and process data in programming.              | Understand      |
| CO4 | Utilize pointers to handle memory and work with strings to manage text in their programs.                       | Apply           |
| CO5 | Infer structures and unions to group different types of data and perform file operations to save and load data. | Apply           |

**TEXT BOOKS:**

1. Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2017.
2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, 2011.

**REFERENCES:**

1. Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publication, 19th Edition, 2022.
2. Robert C. Seacord, "Effective C", No Starch Press, 2020.
3. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.
4. Ashok N.Kamathane, 'Computer Programming, Pearson Education, India, Third Edition ,2015.
5. <https://archive.nptel.ac.in/courses/106/105/106105171/>

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 3   | 2   | 3   | 3   | 1   | -   | -   | -   | -    | -    | 3    | 2    |
| CO2         | 3   | 2   | 2   | 3   | 3   | 1   | -   | -   | -   | -    | -    | 3    | 2    |
| CO3         | 2   | 3   | 2   | 2   | 3   | 1   | -   | -   | -   | -    | -    | 3    | 2    |
| CO4         | 3   | 3   | 2   | 3   | 2   | 1   | -   | -   | -   | -    | -    | 3    | 2    |
| CO5         | 3   | 2   | 2   | 2   | 3   | 1   | -   | -   | -   | -    | -    | 3    | 2    |
| Avg.        | 2.8 | 2.6 | 2   | 2.4 | 2.8 | 1   | -   | -   | -   | -    | -    | 3    | 2    |

1-low, 2-medium, 3-high

| 24GET19   | HERITAGE OF TAMILS   | Category    | L | T | P | C                      |
|---|--|-------------|---|---|---|------------------------|
|   |  | HSMC        | 1 | 0 | 0 | 1                      |
| <b>(common to all branches)</b>   |  |             |   |   |   |                        |
| <b>UNIT – I</b>   | <b>LANGUAGE AND LITERATURE</b>   | <b>(03)</b> |   |   |   |                        |
| Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan. |  |             |   |   |   |                        |
| <b>UNIT – II</b>  | <b>HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE</b>   | <b>(03)</b> |   |   |   |                        |
| Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.   |  |             |   |   |   |                        |
| <b>UNIT – III</b>   | <b>FOLK AND MARTIAL ARTS</b>   | <b>(03)</b> |   |   |   |                        |
| Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.  |  |             |   |   |   |                        |
| <b>UNIT – IV</b>  | <b>THINAI CONCEPT OF TAMILS</b>  | <b>(03)</b> |   |   |   |                        |
| Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.  |  |             |   |   |   |                        |
| <b>UNIT – V</b>   | <b>CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE</b>   | <b>(03)</b> |   |   |   |                        |
| Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.   |  |             |   |   |   |                        |
| <b>Total : 15 Periods</b>   |  |             |   |   |   |                        |
| <b>Course Outcomes :</b>  |  |             |   |   |   | <b>Cognitive Level</b> |
| <b>At the end of the course, the students will be able to:</b>  |  |             |   |   |   |                        |
| CO1   | Recognize the extensive literature of Tamil and its classical nature.  |             |   |   |   | Understand             |
| CO2   | Apprehend the heritage of sculpture, painting and musical instruments of ancient people.   |             |   |   |   | Understand             |
| CO3   | Review on folk and martial arts of Tamil people.   |             |   |   |   | Understand             |
| CO4   | Insightthinai concepts, trade and victory of Chozha dynasty.   |             |   |   |   | Understand             |
| CO5   | Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.                                    |             |   |   |   | Understand             |
| <b>Text Books :</b>   |  |             |   |   |   |                        |
| 1   | Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)  |             |   |   |   |                        |
| 2   | Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies) |             |   |   |   |                        |



**Reference Books :**

- 1 Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
- 2 The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Published by International Institute of Tamil Studies).
- 3 Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
- 4 Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)

| Mapping of COs with POs and PSOs |   |                    |     |     |     |     |     |     |     |     |      |      |      |      |
|----------------------------------|---|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO                               | Course Outcomes   | Programme Outcomes |     |     |     |     |     |     |     |     |      |      |      |      |
|                                  |   | PO1                | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
| CO1                              | Recognize the extensive literature of Tamil and its classical nature.                                   | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO2                              | Apprehend the heritage of sculpture, painting and musical instruments of ancient people.                | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO3                              | Review on folk and martial arts of Tamil people.  | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO4                              | Insightthinai concepts, trade and victory of Chozha dynasty.  | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO5                              | Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine. | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| <b>Average</b>                   |   | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

| 24GET19  | தமிழர் மரபு  | Category | L | T | P | C               |  |
|--|--|----------|---|---|---|-----------------|--|
|  |  | HSMC     | 1 | 0 | 0 | 1               |  |
| (அனைத்து துறைகளுக்கும் பொதுவானது)  |  |          |   |   |   |                 |  |
| அலகு - I   | மொழி மற்றும் இலக்கியம்   |          |   |   |   | (03)            |  |
| இந்திய மொழிக் குடும்பங்கள் - திராவிடமொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலயக்கிகியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்காப்பியங்கள், தமிழகத்தில் சமணபௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலகியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. |  |          |   |   |   |                 |  |
| அலகு - II  | மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை                                  |          |   |   |   | (03)            |  |
| நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண்சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனியில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை. வீணை. யாழ். நாத்தல்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.  |  |          |   |   |   |                 |  |
| அலகு - III   | நாட்டுப் புறக்கலைகள் மற்றும் வீரவிளையாட்டுக்கள்  |          |   |   |   | (03)            |  |
| தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஓயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.  |  |          |   |   |   |                 |  |
| அலகு - IV  | தமிழர்களின் திணைக் கோட்பாடுகள்   |          |   |   |   | (03)            |  |
| தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்கஇலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள்-தமிழர்கள் போற்றிய அறக்கோட்பாடு- சங்கக்காலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.  |  |          |   |   |   |                 |  |
| அலகு - V   | இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு                   |          |   |   |   | (03)            |  |
| இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிற்பகுதிகளில் தமிழ்பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு கல்வெட்டுகள் கையெழுத்துப்படிக்க - தமிழ்ப் புத்தகங்கள்களின் அச்சுவரலாறு.   |  |          |   |   |   |                 |  |
| Total : 15 Periods   |  |          |   |   |   |                 |  |
| பாடம் கற்றத்தின் விளைவுகள் :பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்   |  |          |   |   |   | அறிவாற்றல் நிலை |  |
| CO1  | தமிழ் மொழியின் செந்தன்மை மற்றும் இலக்கியம் குறித்த தெரிதல்                                   |          |   |   |   | புரிதல்         |  |
| CO2  | தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு                       |          |   |   |   | புரிதல்         |  |
| CO3  | தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீர விளையாட்டுகள் குறித்த தெளிவு                     |          |   |   |   | புரிதல்         |  |
| CO4  | தமிழர்களின் திணைக்கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள். |          |   |   |   | புரிதல்         |  |
| CO5  | இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்தமருத்தவம் பற்றிய புரிதல்.              |          |   |   |   | புரிதல்         |  |
| Text Books :   |  |          |   |   |   |                 |  |
| 1 தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே.பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), <u>உலகத் தமிழாராய்ச்சி நிறுவனம்</u> , சென்னை, 2002   |  |          |   |   |   |                 |  |
| 2 கணினித்தமிழ் - முனைவர் இல.சுந்தரம், விகடன் பிரசுரம், 2016  |  |          |   |   |   |                 |  |
| Reference Books :  |  |          |   |   |   |                 |  |
| 1 கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்லியல் துறை வெளியீடு)   |  |          |   |   |   |                 |  |
| 2 பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)  |  |          |   |   |   |                 |  |
| 3 Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL - (in print)  |  |          |   |   |   |                 |  |

4 Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

| Mapping of COs with POs and PSOs |   |                    |     |     |     |     |     |     |     |     |      |      |      |      |
|----------------------------------|---|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO                               | Course Outcomes   | Programme Outcomes |     |     |     |     |     |     |     |     |      |      |      |      |
|                                  |   | PO1                | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
| CO1                              | தமிழ் மொழியின் செந்தன்மை மற்றும் இலக்கியம் குறித்த தெரிதல்                                    | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO2                              | தமிழர்களின் சிற்பக்கலை மற்றும் ஓவியக்கலை இசைக் கருவிகள் குறித்த தெளிவு                        | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO3                              | தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு                       | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO4                              | தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள். | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO5                              | இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்தவம் பற்றிய புரிதல்.              | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| Average                          |   | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |

1. சிறிது (குறைந்த)

2. மிதமான (நடுத்தர)

3. கணிசமான (உயர்)

| 24MAI19  | MATRICES & CALCULUS                    | Category   | L | T | P | C |
|--|--|------------|---|---|---|---|
|  |  | BSC        | 2 | 1 | 2 | 4 |
| <b>(Common to All Branches)</b>  |  |            |   |   |   |   |
| <b>PREREQUISITE</b>  |  |            |   |   |   |   |
| The students must have the knowledge on the basic concepts of Matrices and its applications, differential equations, differentiation, integration, partial derivatives and vector algebra and basic computer knowledge.  |  |            |   |   |   |   |
| <b>OBJECTIVES:</b>   |  |            |   |   |   |   |
| <ul style="list-style-type: none"> <li>• To understand the concepts of eigen values, eigenvectors and quadratic forms.</li> <li>• To familiarize students how to solve the higher-order linear differential equations.</li> <li>• To develop the skill on the geometric properties of curves using differential calculus.</li> <li>• To equip students to analyze and optimize the functions of several variables.</li> <li>• To apply vector calculus and its principles to evaluate vector fields.</li> </ul>  |  |            |   |   |   |   |
| <b>UNIT - I</b>  | <b>LINEAR ALGEBRA</b>                  | <b>(9)</b> |   |   |   |   |
| Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (Excluding proof) – Cayley Hamilton theorem (excluding proof) – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.   |  |            |   |   |   |   |
| <b>UNIT - II</b>   | <b>ORDINARY DIFFERENTIAL EQUATIONS</b> | <b>(9)</b> |   |   |   |   |
| Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy’s and Legendre’s linear equations – Method of variation of parameters.  |  |            |   |   |   |   |
| <b>UNIT - III</b>  | <b>DIFFERENTIAL CALCULUS</b>           | <b>(9)</b> |   |   |   |   |
| Curvature - Radius of curvature (Cartesian co-ordinates only) – Centre of curvature and Circle of curvature – Involutives and Evolutes (Parabola, Ellipse, Hyperbola and Rectangular hyperbola ).  |  |            |   |   |   |   |
| <b>UNIT - IV</b>   | <b>FUNCTIONS OF SEVERAL VARIABLES</b>  | <b>(9)</b> |   |   |   |   |
| Partial derivatives – Euler’s theorem for homogenous functions – Taylor’s series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.  |  |            |   |   |   |   |
| <b>UNIT - V</b>  | <b>VECTOR CALCULUS</b>                 | <b>(9)</b> |   |   |   |   |
| Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Green’s theorem in plane, Gauss divergence theorem and Stoke’s theorem (Cube, Cuboid and Rectangular Paralleopiped only).   |  |            |   |   |   |   |
| <b>List of Exercise/Experiments(MAT LAB):</b>  |  |            |   |   |   |   |
| <ol style="list-style-type: none"> <li>1. Calculate the characteristic equation and eigen values</li> <li>2. Find the eigenvector and diagonalization of a given matrix.</li> <li>3. Solving ODE with constant coefficients</li> <li>4. Detect the solution of ODE with variable coefficients</li> <li>5. Identify the radius of curvature</li> <li>6. Establish the evolutes of curve.</li> <li>7. Reckon the Taylor’s series for functions of two variables.</li> <li>8. Compute the maxima and minima.</li> <li>9. Estimate the directional derivative, divergence and curl.</li> <li>10. Determine line integral, surface integral and volume integral.</li> </ol> |  |            |   |   |   |   |
| <b>Lecture: 45 Laboratory: 30 TOTAL: 75 PERIODS</b>  |  |            |   |   |   |   |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome  | Cognitive Level |
|-----|---|-----------------|
| CO1 | Assimilate the eigen values and eigen vectors in reduction of quadratic form into canonical form. | Apply           |
| CO2 | Solve higher-order linear differential equations with constant and variable coefficients.         | Understand      |
| CO3 | Analyze the center of curvature, circle of curvature and develop the evolutes.                    | Understand      |
| CO4 | Expand the Taylor series and calculate the extremum value for function of several variables.      | Apply           |
| CO5 | Apply the divergence and curl in vector integral theorems of vector fields.                       | Apply           |

**TEXT BOOKS:**

1. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics – I", Mc-Graw Hill Publications, New Delhi, 2<sup>nd</sup> Edition, 2020.

2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40<sup>th</sup> Edition, 2020.

**REFERENCES:**

1. Bali N. P and Manish Goyal, "Engineering Mathematics", Laxmi Publications Pvt Ltd., 7<sup>th</sup> Edition, 2020.

2. Dass H.K, "Advance Engineering Mathematics", S. Chand and company, 11<sup>th</sup> Edition, 2014.

3. Jain R.K. and Iyengar S.R.K, "Advanced Engineering Mathematics", Narosa Publications, 8<sup>th</sup> Edition, 2012.

4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, New Delhi, 10<sup>th</sup> Edition 2016.

5. <https://archive.nptel.ac.in/courses/111/108/111108157/>

6. <https://archive.nptel.ac.in/courses/111/105/111105122/>

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 3   | 3   | 3   | 2   | 1   | -   | -   | -   | -    | 1    | 2    | -    |
| CO2         | 3   | 3   | 3   | 3   | 2   | 1   | -   | -   | -   | -    | 1    | 2    | -    |
| CO3         | 3   | 3   | 3   | 3   | 2   | 1   | -   | -   | -   | -    | 1    | 2    | -    |
| CO4         | 3   | 3   | 3   | 3   | 2   | 1   | -   | -   | -   | -    | 1    | 2    | -    |
| CO5         | 3   | 3   | 3   | 3   | 2   | 1   | -   | -   | -   | -    | 1    | 2    | -    |
| Avg.        | 3   | 3   | 3   | 3   | 2   | 1   | -   | -   | -   | -    | 1    | 2    | -    |

1-low, 2-medium, 3-high

| 24CHI06   | CHEMISTRY FOR ENGINEERS               | Category | L | T | P | C          |
|---|---------------------------------------|----------|---|---|---|------------|
|   |                                       | BSC      | 3 | 0 | 2 | 4          |
| <b>(Common to BME, CSD, CSE, CSE(CS), CSE(IoT), ECE, EEE and IT)</b>  |                                       |          |   |   |   |            |
| <b>PREREQUISITE</b>   |                                       |          |   |   |   |            |
| The students must have knowledge about basic concepts of atoms, molecules, periodical properties, chemical bonding, molecular structure, shapes of the orbitals, electro chemistry, thermodynamics, chemical kinetics, organic reactions and their applications.  |                                       |          |   |   |   |            |
| <b>OBJECTIVES:</b>  |                                       |          |   |   |   |            |
| <ul style="list-style-type: none"> <li>• To gain in depth knowledge on the water treatment methods and its industrial applications.</li> <li>• To acquaint the basic concepts of corrosion mechanism and its control.</li> <li>• To assimilate the principles and functioning of batteries, fuel cell and solar cell.</li> <li>• To get a deeper insight conversant with basic concepts and applications of polymers.</li> <li>• To impart knowledge on manufacture, properties, uses of nano materials and Composites.</li> </ul>  |                                       |          |   |   |   |            |
| <b>UNIT - I</b>   | <b>WATER TREATMENT</b>                |          |   |   |   | <b>(9)</b> |
| Hardness – types, units – estimation of hardness by EDTA method; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge – priming and foaming – caustic embrittlement – boiler corrosion. Softening methods – internal conditioning – calgon, phosphate – external conditioning – zeolite process and ion exchange process; Desalination – reverse osmosis. Domestic water treatment (Sterilisation process Only).   |                                       |          |   |   |   |            |
| <b>UNIT - II</b>  | <b>ELECTROCHEMISTRY AND CORROSION</b> |          |   |   |   | <b>(9)</b> |
| Introduction – electrode potential – Nernst equation – EMF series and its significance; E – Vehicles - Need - Types – Advantages and Disadvantages; Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control (Sacrificial anode and Impressed Current Cathodic protection method).   |                                       |          |   |   |   |            |
| <b>UNIT - III</b>   | <b>ENERGY STORAGE DEVICES</b>         |          |   |   |   | <b>(9)</b> |
| Batteries – primary battery – Dry cell, secondary batteries – lead-acid and lithium-ion batteries. Fuel cells – H <sub>2</sub> -O <sub>2</sub> fuel cell, solar cells – principle, applications and advantages; Nuclear energy: Light water Nuclear power plant - breeder reactor.  |                                       |          |   |   |   |            |
| <b>UNIT - IV</b>  | <b>POLYMER CHEMISTRY</b>              |          |   |   |   | <b>(9)</b> |
| Polymer – definition – degree of polymerization – functionality. Polymerization – addition, condensation and co-polymerization – free radical mechanism of addition polymerization; Preparation properties & uses of PVC, Nylon – 6,6 & Teflon. Plastics – classification – thermosetting and thermoplastics. Fabrication of polymers – compression and Injection moulding.   |                                       |          |   |   |   |            |
| <b>UNIT - V</b>   | <b>NANO CHEMISTRY AND COMPOSITES</b>  |          |   |   |   | <b>(9)</b> |
| Introduction – basics of nano chemistry – distinction between nano particles, molecules and bulk materials - synthesis of nano materials [CVD, laser evaporation, pyrolysis] - applications of nano materials. Composite – Introduction: Definition and need for composite – Types of composite: Properties and application of FRP and MMC.   |                                       |          |   |   |   |            |
| <b>List of Exercise/Experiments:</b>  |                                       |          |   |   |   |            |
| <ol style="list-style-type: none"> <li>1. Estimation of total, permanent and temporary hardness of water sample By EDTA method</li> <li>2. Estimation of chloride content in water by Argentometric method [Mohr's Method]</li> <li>3. Conductometric titration of strong acid with strong base (HCl Vs NaOH)</li> <li>4. Determination of rate of corrosion of mild steel by weight loss method</li> <li>5. Estimation of dissolved oxygen in water (Winkler's Method)</li> <li>6. Conductometric titration of mixture of acids (HCl &amp; CH<sub>3</sub>COOH) with strong base</li> <li>7. Estimation of Fe<sup>2+</sup> ion by potentiometric titration</li> <li>8. Estimation of HCl by p<sup>H</sup>- Metry</li> <li>9. Conductometric precipitation titration using BaCl<sub>2</sub>-Na<sub>2</sub>SO<sub>4</sub></li> <li>10. Preparation of ZnO nanocrystal by precipitation method.</li> </ol> |                                       |          |   |   |   |            |
| <b>Lecture:45 Laboratory:30 TOTAL: 75 PERIODS</b>   |                                       |          |   |   |   |            |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome  | Cognitive Level |
|-----|---|-----------------|
| CO1 | Assess the quality of water from quality water parameters   | Understand      |
| CO2 | Recognize the concept of corrosion and its control.   | Understand      |
| CO3 | Make use of batteries, fuel cell and solar cell for the production of electricity.                        | Apply           |
| CO4 | Apply the basics concepts of polymer chemistry in designing the materials for engineering and technology. | Apply           |
| CO5 | Identify the nano materials and composites for engineering and technology.                                | Apply           |

**TEXT BOOKS:**

1. S S. Dara and S. S. Umare, "A Text book of Engineering Chemistry", S.Chand & Co.Ltd., 12<sup>th</sup> Edition, 2015.
2. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub. Co., 16<sup>th</sup> Edition, 2013.
3. Wiley, "Engineering Chemistry", Wiley India Pvt. Ltd., 2<sup>nd</sup> Edition, 2013.

**REFERENCES:**

1. Dr. A. Ravikrishnan, "Engineering Chemistry", Srikrishna Hi-tech Publishing Company Pvt. Ltd., 21<sup>st</sup> Edition, 2022.
2. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Text book of Quantitative Chemical Analysis", Pearson Education Pvt., Ltd., 6<sup>th</sup> Edition, 2019.
3. Shashi Chala, "A Text book of Engineering Chemistry", Dhanpat Rai Pub. Co., 2015.
4. S. K. Bhasin and Sudha Rani, "Laboratory Manual of Engineering Chemistry", Dhanpat Rai Publishing Company Private Limited, 3<sup>rd</sup> Edition, 2012.

**NPTEL LINKS:**

1. <https://nptel.ac.in/courses/113101098>
2. <https://nptel.ac.in/courses/113105102>
3. <https://archive.nptel.ac.in/courses/104/105/104105039>

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high

|  |  |                 |          |          |          |                        |
|--|--|-----------------|----------|----------|----------|------------------------|
| 24ITP16  | <b>PROGRAMMING FOR PROBLEM SOLVING<br/>LABORATORY</b>  | <b>Category</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>               |
|  |  | <b>ESC</b>      | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b>               |
| <b>(Common to AUTO, BME,CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE, MECH)</b>   |  |                 |          |          |          |                        |
| <b>PREREQUISITE:</b><br>Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.   |  |                 |          |          |          |                        |
| <b>OBJECTIVES:</b> <ul style="list-style-type: none"> <li>• To learn the basic of MS word, Excel, Power Point presentation and MS Access.</li> <li>• To articulate how to develop a program with a desired runtime execution flow.</li> <li>• To develop computer programs using C basics concepts.</li> <li>• To get familiarity on functions, strings and pointers.</li> <li>• To acquire and apply the file manipulation</li> </ul>   |  |                 |          |          |          |                        |
| <b>List of Experiments:</b> <ol style="list-style-type: none"> <li>1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same to too many recipients using mail merge.</li> <li>2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and charts.</li> <li>3. i) Prepare a Power Point presentation for your organization with varying animation effects using timer.<br/>ii) Prepare a Student Database in MS Access, manipulate the data and generate report.</li> <li>4. Programs using I/O statements and expressions.</li> <li>5. Design an algorithm and flowchart with example.</li> <li>6. Programs using decision-making constructs: if-else, goto, switch-case, break-continue.</li> <li>7. Loops: for, while, do-while.</li> <li>8. Arrays: 1D and 2D</li> <li>9. Strings: operations</li> <li>10. Functions: passing parameters by (value, reference), Recursion</li> <li>11. Pointers and structures</li> <li>12. File operations.</li> </ol> |  |                 |          |          |          |                        |
| <b>TOTAL: 30 PERIODS</b>   |  |                 |          |          |          |                        |
| <b>COURSE OUTCOMES:</b><br><b>At the end of the course, the students will be able to:</b>  |  |                 |          |          |          |                        |
| <b>COs</b>   | <b>Course Outcome</b>  |                 |          |          |          | <b>Cognitive Level</b> |
| CO1  | Interpret the basic concept of MS word, Excel, Power Point presentation and MS Access and C programming. |                 |          |          |          | Apply                  |
| CO2  | Develop the program using the concept of control statements.   |                 |          |          |          | Apply                  |
| CO3  | Demonstrate the use of functions and arrays in Programming.  |                 |          |          |          | Apply                  |
| CO4  | Apply the concepts of pointers and structures.   |                 |          |          |          | Apply                  |
| CO5  | Develop the program using the file and string operations.  |                 |          |          |          | Apply                  |



**REFERENCES:**

1. Jeff Szuha, "Learn C Programming", Packt Publishing, United Kingdom, Second Edition, 2022.
2. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 3   | 2   | 3   | 3   | 1   | –   | –   | –   | –    | –    | 3    | 3    |
| CO2         | 3   | 3   | 2   | 3   | 3   | 1   | –   | –   | –   | –    | –    | 3    | 3    |
| CO3         | 3   | 3   | 2   | 2   | 3   | 1   | –   | –   | –   | –    | –    | 3    | 3    |
| CO4         | 3   | 3   | 2   | 3   | 3   | 1   | –   | –   | –   | –    | –    | 3    | 3    |
| CO5         | 3   | 3   | 2   | 2   | 3   | 1   | –   | –   | –   | –    | –    | 3    | 3    |
| Avg.        | 3   | 3   | 2   | 2.6 | 3   | 1   | –   | –   | –   | –    | –    | 3    | 3    |

1-low, 2-medium, 3-high

| 24MEP16   | ENGINEERING GRAPHICS LABORATORY  |     |     |     |     | Category | L   | T   | P   | C   |                 |      |      |      |
|---|--|-----|-----|-----|-----|----------|-----|-----|-----|-----|-----------------|------|------|------|
|   |  |     |     |     |     | ESC      | 1   | 0   | 2   | 2   |                 |      |      |      |
| <b>(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE)</b>   |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>PREREQUISITE</b>   |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| Engineering Graphics Laboratory requires a good understanding of geometry and algebra. This includes knowledge of shapes, angles, dimensions, and spatial reasoning. Knowing the conventions and standards used in engineering drawings, such as line types, symbols, and dimensions, is important. Experience with freehand sketching and understanding of drawing tools and techniques can be advantageous. The ability to visualize and interpret three-dimensional objects from two-dimensional drawings is crucial.  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>OBJECTIVES:</b>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <ul style="list-style-type: none"> <li>• To study the drawing tools, commands and draw the two dimensional drawings in the CAD software.</li> <li>• To perceive the orthographic views and draw the projections in the CAD software.</li> <li>• To acquire the knowledge to observe the sectional views and develop the lateral surfaces of the simple solids.</li> <li>• To sketch the isometric projections of simple solids.</li> <li>• To avail the drafts of the 3D models using drafting tools.</li> </ul>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>List of Exercise/Experiments:</b>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <ol style="list-style-type: none"> <li>1. Study of drawing tools, commands and coordinate systems in 2D software.</li> <li>2. Cycloid and Conic curves.</li> <li>3. Orthographic projections of pictorial views.</li> <li>4. Orthographic views of straight lines.</li> <li>5. Orthographic views of planes.</li> <li>6. Orthographic views of simple solids.</li> <li>7. The sectional view and the true shape of simple solids.</li> <li>8. Development of lateral surfaces of simple solids.</li> <li>9. Isometric projection of simple solids.</li> <li>10. Drafting the 2D multi-view drawings from 3D model.</li> </ol> |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>TOTAL: 30 PERIODS</b>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>COURSE OUTCOMES:</b>   |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>At the end of the course, the students will be able to:</b>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| COs   | Course Outcome   |     |     |     |     |          |     |     |     |     | Cognitive Level |      |      |      |
| CO1   | Recall the drawing tools and commands and produce two dimensional objects in CAD software. |     |     |     |     |          |     |     |     |     | Remember        |      |      |      |
| CO2   | Obtain the orthographic views using CAD software.  |     |     |     |     |          |     |     |     |     | Understand      |      |      |      |
| CO3   | Attain sectional views and develop the lateral surfaces of simple solids.                  |     |     |     |     |          |     |     |     |     | Understand      |      |      |      |
| CO4   | Portray the isometric projection of simple solids.   |     |     |     |     |          |     |     |     |     | Understand      |      |      |      |
| CO5   | Acquire drafts of 3D model.  |     |     |     |     |          |     |     |     |     | Apply           |      |      |      |
| <b>REFERENCES:</b>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <ol style="list-style-type: none"> <li>1. Bhatt. N. D., Engineering Drawing, Charotar Publishing House, Fifty Third Edition, 2014.</li> <li>2. Basant Agarwal and Agarwal. C. M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, 2018.</li> </ol>  |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| <b>Mapping of COs with POs and PSOs</b>   |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |
| COs/<br>POs   | PO1  | PO2 | PO3 | PO4 | PO5 | PO5      | PO6 | PO7 | PO8 | PO9 | PO10            | PO11 | PSO1 | PSO2 |
| CO1   | 3  | -   | -   | -   | 3   | -        | -   | -   | -   | 2   | -               | 1    | -    | -    |
| CO2   | 3  | -   | -   | -   | 3   | -        | -   | -   | -   | 2   | -               | 1    | -    | -    |
| CO3   | 3  | -   | -   | -   | 3   | -        | -   | -   | -   | 2   | -               | 1    | -    | -    |
| CO4   | 3  | -   | -   | -   | 3   | -        | -   | -   | -   | 2   | -               | 1    | -    | -    |
| CO5   | 3  | -   | -   | -   | 3   | -        | -   | -   | -   | 2   | -               | 1    | -    | -    |
| Avg.  | 3  | -   | -   | -   | 3   | -        | -   | -   | -   | 2   | -               | 1    | -    | -    |
| 1-low, 2-medium, 3-high   |  |     |     |     |     |          |     |     |     |     |                 |      |      |      |

| 24GEP16  | ENGINEERING EXPERIENCE LABORATORY | Category | L | T | P | C |
|--|-----------------------------------|----------|---|---|---|---|
|  |                                   | ESC      | 0 | 0 | 2 | 1 |
| <b>(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), ECE, EEE, IT)</b>  |                                   |          |   |   |   |   |
| <b>PREREQUISITE:</b><br>Students must have a basic knowledge of electrical components like switches, wires, fuses, and light bulbs along with different wire types and their purposes. A basic understanding of engineering principles, such as physics, electrical and mechanical engineering, is also essential.   |                                   |          |   |   |   |   |
| <b>OBJECTIVES:</b> <ul style="list-style-type: none"> <li>• To gain practical experience in wiring circuits, including the installation of switches, outlets, lighting fixtures, and other electrical components.</li> <li>• To acquire the relationship between voltage, current, power, and energy in single-phase systems.</li> <li>• To demonstrate the application of Internet of Things (IoT) concepts by integrating sensors, actuators, and communication modules to create connected systems and devices.</li> <li>• To explicate the function and operation of different types of sensors and how they interface with the Arduino to collect and process data for controlling circuits.</li> <li>• To acquire the fundamental components and functions of plumbing systems, including pipes, valves, fittings, and fixtures, and how they are integrated into engineering practices and applications.</li> </ul> |                                   |          |   |   |   |   |
| <b>LIST OF EXPERIMENTS</b>   |                                   |          |   |   |   |   |
| <b>GROUP - A (ELECTRICAL)</b>  |                                   |          |   |   |   |   |
| <ol style="list-style-type: none"> <li>1. Fluorescent lamp wiring.</li> <li>2. Stair-case wiring.</li> <li>3. Residential house wiring using switches, fuse, indicator and lamp.</li> <li>4. Measurement of Energy in single phase system.</li> </ol>  |                                   |          |   |   |   |   |
| <b>GROUP - B (ELECTRONICS)</b>   |                                   |          |   |   |   |   |
| <ol style="list-style-type: none"> <li>1. Study of Electronic Components, Instruments, Internet of Things (IOT) and Arduino IDE.</li> <li>2. Controlling the Light Emitting Diode (LED) with a push button Using Arduino.</li> <li>3. Interfacing of a Sensor (Ultrasonic, Rain, Voltage, Current &amp; PIR) with Arduino Uno.</li> <li>4. Controlling of LED through Wi-Fi using ESP8266.</li> </ol>  |                                   |          |   |   |   |   |
| <b>GROUP - C (MECHANICAL)</b>  |                                   |          |   |   |   |   |
| <ol style="list-style-type: none"> <li>1. Study of plumbing line sketches for water supply and carpentry tools.</li> <li>2. Study of welding tools and centrifugal pump.</li> </ol>  |                                   |          |   |   |   |   |

| <b>COURSE OUTCOMES:</b>   |   |                        |
|---|---|------------------------|
| <b>At the end of the course, the students will be able to:</b>  |   |                        |
| <b>COs</b>  | <b>Course Outcome</b>   | <b>Cognitive Level</b> |
| <b>CO1</b>  | Construct different types of wiring used in residential houses.   | Apply                  |
| <b>CO2</b>  | Measure the energy in a single-phase system.  | Apply                  |
| <b>CO3</b>  | Demonstrate different electronic components, instruments, IoT and Arduino IDE.  | Apply                  |
| <b>CO4</b>  | Construct the control circuit with the help of Arduino and sensors.   | Apply                  |
| <b>CO5</b>  | Describe the plumbing, carpentry, welding components and centrifugal pump works for engineering practices and applications. | Understand             |
| <b>REFERENCES:</b>  |   |                        |
| 1 Gupta J.P., "A Course in Electrical Installation Estimating and Costing", S.K. Kataria and Sons, Delhi, Reprint 2013 Edition, 2013. |   |                        |
| 2 Mike Cheich, "Arduino Book for Beginners", Programming Electronics Academy, 2021.   |   |                        |

| <b>Mapping of COs with POs and PSOs</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <b>COs/<br/>POs</b>                     | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PO11</b> | <b>PSO1</b> | <b>PSO2</b> |
| CO1                                     | 3          | 3          | 2          | -          | -          | 2          | 2          | 3          | 2          | -           | 3           | -           | -           |
| CO2                                     | 3          | 3          | 2          | -          | -          | 2          | 2          | 3          | 2          | -           | 3           | -           | -           |
| CO3                                     | 3          | 3          | 3          | 3          | -          | -          | 2          | 3          | 2          | -           | 3           | -           | -           |
| CO4                                     | 3          | 3          | 3          | 3          | -          | -          | 2          | 3          | 2          | -           | 3           | -           | -           |
| CO5                                     | 3          | 3          | 3          | -          | -          | -          | 2          | 3          | 2          | -           | 3           | -           | -           |
| Avg.                                    | 3          | 3          | 2.6        | 1.2        | -          | 0.8        | 2          | 3          | 2          | -           | 3           | -           | -           |
| 1 - Low, 2 - Medium, 3 - High           |            |            |            |            |            |            |            |            |            |             |             |             |             |

| 24SSP19  | APTITUDE AND CODING SKILL – I   | Category | L | T | P | C               |
|--|---|----------|---|---|---|-----------------|
|  |   | EEC      | 2 | 0 | 2 | 1               |
| <b>(Common to All Branches)</b>  |   |          |   |   |   |                 |
| <b>OBJECTIVES:</b>   |   |          |   |   |   |                 |
| <b>The Course will enable learners to:</b>   |   |          |   |   |   |                 |
| <ul style="list-style-type: none"> <li>• To introduce the students about Aptitude</li> <li>• To expose to the Needs of Aptitude and its importance</li> <li>• To develop proficiency in verbal reasoning for improved problem-solving ideas.</li> <li>• To develop a strong foundation in English grammar.</li> <li>• To introduce advanced topics including pointers, user-defined data types, and memory management.</li> </ul>  |   |          |   |   |   |                 |
| <b>UNIT - I</b>  | <b>BASIC OF NUMBER SYSTEMS &amp; FOUNDATION</b>   |          |   |   |   | (6)             |
| Introduction to Number System and its Classification - Divisibility Rules and Problems –Place Value & Face Value - HCF & LCM and its properties.   |   |          |   |   |   |                 |
| <b>UNIT - II</b>   | <b>BASICS OF SHARE BASED CONCEPTS</b>   |          |   |   |   | (6)             |
| Introduction to Average –Basics of Ratio and proportion – Basics of Partnership–Introduction to Percentage   |   |          |   |   |   |                 |
| <b>UNIT - III</b>  | <b>LOGICAL REASONING</b>  |          |   |   |   | (4)             |
| Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Direction and distance  |   |          |   |   |   |                 |
| <b>UNIT - IV</b>   | <b>VERBAL ABILITY</b>   |          |   |   |   | (7)             |
| Introduction to Grammar – Tenses – Parts of Speech – Preposition – Articles – Modal Verbs  |   |          |   |   |   |                 |
| <b>UNIT - V</b>  | <b>C PROGRAMMING</b>  |          |   |   |   | (7)             |
| C Basics-Control Statements Decision making – Functions – Arrays & Strings – Pointers - User Defined Data Types - Storage Classes - Memory Management - Preprocessor.  |   |          |   |   |   |                 |
| <b>TOTAL: 30 PERIODS</b>   |   |          |   |   |   |                 |
| <b>COURSE OUTCOMES:</b>  |   |          |   |   |   |                 |
| <b>At the end of the course, the students will be able to:</b>   |   |          |   |   |   |                 |
| COs  | Course Outcome  |          |   |   |   | Cognitive Level |
| CO1  | Develop problem-solving skills and identify optimal solutions efficiently.                        |          |   |   |   | Understanding   |
| CO2  | Solve problems on quantitative aptitude   |          |   |   |   | Applying        |
| CO3  | Resolve problems with logical reasoning   |          |   |   |   | Applying        |
| CO4  | Develop proficiency in verbal and communication for improved and effective articulation of ideas. |          |   |   |   | Applying        |
| CO5  | Implement C coding with appropriate data structures and pointers.                                 |          |   |   |   | Applying        |
| <b>TEXT BOOKS:</b>   |   |          |   |   |   |                 |
| <ol style="list-style-type: none"> <li>1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.</li> <li>2. R.S. Aggarwal, A Modern Approach to Verbal &amp; Non-Verbal Reasoning</li> <li>3. Wren &amp; Martin, High School English Grammar &amp; Composition</li> <li>4. Brian W. Kernighan and Dennis Ritchie, The C Programming Language 2e, Pearson Education, 2015.</li> <li>5. Yashavant Kanetkar, The C Programming Language 2e, BPB publications,15<sup>th</sup> Edition, 2016</li> </ol> |   |          |   |   |   |                 |

**REFERENCES:**

1. <https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm>
2. Stephen G. Kochana, Programming in C, 3<sup>rd</sup> Edition.
3. K. N. King, C Programming: A Modern Approach, 2e, 2008.
4. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education India, 1990.
5. Robert L. Kruse and Bruce P. Leung, Data Structures and Program Design in C, Pearson Education 2007.
6. <https://www.geeksforgeeks.org/c-programming-language/>
7. <https://www.geeksforgeeks.org/data-structures/>

**Mapping of COs with POs and PSOs**

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

1 - Low, 2 - Medium, 3 - High

| 24CST29  | PYTHON PROGRAMMING                          | Category | L | T | P | C          |
|--|---|----------|---|---|---|------------|
|  |   | ESC      | 3 | 0 | 0 | 3          |
| <b>(Common to All Branches)</b>  |   |          |   |   |   |            |
| <b>PREREQUISITE:</b>   |   |          |   |   |   |            |
| A basic understanding of programming principles such as variables and loops, paired with good problem-solving abilities, is required. Logical thinking and analytical skills are critical for effective programming.   |   |          |   |   |   |            |
| <b>OBJECTIVES:</b>   |   |          |   |   |   |            |
| <ul style="list-style-type: none"> <li>• To introduce the fundamental concepts of Python programming, including variables, control structures and functions.</li> <li>• To teach string manipulation, data structures, and exception handling in Python.</li> <li>• To establish a solid understanding of object-oriented programming in Python, covering inheritance, polymorphism, and operator overloading.</li> <li>• To enable students to perform file operations and manage databases using Python.</li> <li>• To introduce web programming and GUI development in Python using Django and Tkinter frameworks.</li> </ul> |   |          |   |   |   |            |
| <b>UNIT – I</b>  | <b>FUNDAMENTALS OF PYTHON</b>               |          |   |   |   | <b>(9)</b> |
| Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – Indentation– I/O function –Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.  |   |          |   |   |   |            |
| <b>UNIT – II</b>   | <b>HANDLING STRINGS AND EXCEPTIONS</b>      |          |   |   |   | <b>(9)</b> |
| Strings – List – Tuples – Dictionaries– Sets – Exception Handling: Built-in Exceptions – User-defined exception– Modules and Packages.   |   |          |   |   |   |            |
| <b>UNIT – III</b>  | <b>OBJECT ORIENTED PROGRAMMING CONCEPTS</b> |          |   |   |   | <b>(9)</b> |
| Object Oriented Programming basics –Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling –Duck Typing – Relationships.  |   |          |   |   |   |            |
| <b>UNIT–IV</b>   | <b>FILES AND DATA BASES</b>                 |          |   |   |   | <b>(9)</b> |
| File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using MySQL.  |   |          |   |   |   |            |
| <b>UNIT – V</b>  | <b>WEB PROGRAMING AND GUI USING PYTHON</b>  |          |   |   |   | <b>(9)</b> |
| Frameworks: Introduction to Django – Django CRUD– Socket Programming– Sending email –UI design: Tkinter – Events– CGI: Introduction to CGI Programming, GET and POST Methods.  |   |          |   |   |   |            |
| <b>TOTAL: 45 PERIODS</b>   |   |          |   |   |   |            |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome   | Cognitive Level |
|-----|--|-----------------|
| CO1 | Infer Python syntax to write code, using data types, operators, loops and conditionals.                                | Understand      |
| CO2 | Interpret string manipulation, data structures and exception handling to build robust applications.                    | Understand      |
| CO3 | Implement object-oriented programming principles, such as inheritance and polymorphism, to design effective solutions. | Apply           |
| CO4 | Make use of file I/O operations and database management techniques to manage and manipulate data efficiently.          | Apply           |
| CO5 | Develop web applications and graphical user interfaces using Python frameworks and libraries                           | Apply           |

**TEXT BOOKS:**

- 1.YashwantKanetkar, Aditya Kanetkar, “Let Us Python”, BPB Publications, 5th Edition ,2023
2. Wesley J.Chun, “Core Python Programming”, Pearson Education, 2nd Edition, 2017

**REFERENCES:**

1. Robert Oliver, “Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications”, Clyde Bank Media LLC,1st Edition, 2023
2. Allen B. Downey, “Think Python”, O’Reilly Media, 2nd Edition, 2016.
3. David Beazley, Brian K. Jones, “Python Cookbook”, O’Reilly Media, 3rd Edition, 2013
4. Mark Lutz, “Python Pocket Reference”, O’Reilly Media,5th Edition, 2014
5. www.python.org
6. [https://onlinecourses.swayam2.ac.in/cec22\\_cs20/preview](https://onlinecourses.swayam2.ac.in/cec22_cs20/preview)

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 3   | 2   | 2   | 1   | -   | -   | 1   | -   | -    | 3    | 3    | 3    |
| CO2         | 3   | 3   | 3   | 2   | 2   | -   | -   | 1   | -   | -    | 3    | 3    | 3    |
| CO3         | 3   | 3   | 3   | 2   | 2   | -   | -   | 1   | -   | -    | 3    | 3    | 3    |
| CO4         | 3   | 3   | 3   | 3   | 2   | -   | -   | 1   | -   | -    | 2    | 3    | 3    |
| CO5         | 3   | 3   | 3   | 3   | 2   | -   | -   | 1   | -   | -    | 2    | 3    | 3    |
| Avg.        | 3   | 3   | 3   | 2.4 | 1.8 | -   | -   | 1   | -   | -    | 2.6  | 3    | 3    |

1-low, 2-medium, 3-high



| 24CST21   | DESIGN THINKING   | Category | L | T | P | C          |
|---|---|----------|---|---|---|------------|
|   |   | PCC      | 2 | 0 | 0 | 2          |
| <b>PRE-REQUISITE</b>  |   |          |   |   |   |            |
| Students are expected to have an empathetic mindset to help them understand users, a curious mindset to explore and questions assumptions, a collaborative mindset for interdisciplinary teamwork, an iterative approach for refining ideas and creativity to generate innovative solutions   |   |          |   |   |   |            |
| <b>Objectives</b>   |   |          |   |   |   |            |
| <ul style="list-style-type: none"> <li>• Learn Design Thinking concepts and principles</li> <li>• Understand the importance of the Design Mind</li> <li>• Use Design Thinking methods in every stage of problem solving</li> <li>• Learn the different phases of Design Thinking</li> <li>• Learn and apply various Design Thinking tools</li> </ul>  |   |          |   |   |   |            |
| <b>UNIT - I</b>   | <b>FUNDAMENTALS OF DESIGN THINKING</b>                    |          |   |   |   | <b>(6)</b> |
| What is Design Thinking? - When to use Design Thinking? - How to do it? - Who are involved in this? – Design The Thinking– Personal Visualization, The Wheel of Life & Balancing Priorities – Appreciating ‘Design’ – The 3 Laws of Design Thinking   |   |          |   |   |   |            |
| <b>UNIT - II</b>  | <b>STEP 1: THE ‘FEEL’ STAGE</b>                           |          |   |   |   | <b>(6)</b> |
| What is this stage about? – What role does a Design Thinker play in this stage? Tools – What is the purpose in this stage? – Persona – Journey Mapping – Stakeholder Mapping & CATWOE Analysis - Cartographic Perspective (L0) – Empathy Map – Case Study: Understanding the Stakeholders   |   |          |   |   |   |            |
| <b>UNIT - III</b>   | <b>STEP 2: THE ‘DEFINE’ STAGE</b>                         |          |   |   |   | <b>(6)</b> |
| What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Five-Whys – Anti-Pattern – Paraphrasing the Problem – Challenge Mapping – LORD: Definitive skill set for a Design Thinker – Case Study: Relooking at the Problem  |   |          |   |   |   |            |
| <b>UNIT - IV</b>  | <b>STEP 3: THE ‘DIVERGENCE’ &amp; ‘CONVERGENCE’ STAGE</b> |          |   |   |   | <b>(6)</b> |
| What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Brainstorming – Metaphor – Random Association Technique – End-State Visualization - 10gm-100gm-1000gm – Prototyping – Wire framing for digital products – Case Study: Prototyping and Communicating for Effective Outcome |   |          |   |   |   |            |
| <b>UNIT - V</b>   | <b>STEP 5: THE ‘COMMUNICATION’ STAGE</b>                  |          |   |   |   | <b>(6)</b> |
| What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – The 4Cs Framework – Naming – Packaging – Story boarding – Presentation – Distribution   |   |          |   |   |   |            |
| <b>TOTAL: 45 PERIODS</b>  |   |          |   |   |   |            |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome  | Cognitive Level |
|-----|---|-----------------|
| CO1 | Demonstrate an understanding of Design Thinking concepts and principles by explaining their relevance in real-world contexts. | Understanding   |
| CO2 | Articulate the significance of a Design Mindset and its impact on creative problem-solving.                                   | Understanding   |
| CO3 | Apply Design Thinking methods effectively at each stage of the problem-solving process.                                       | Applying        |
| CO4 | Identify and implement the phases of Design Thinking to address complex challenges systematically.                            | Applying        |
| CO5 | Use a variety of Design Thinking tools to develop innovative solutions and refine ideas through iteration.                    | Applying        |

**TEXT BOOKS:**

1. UnMukt – The Science & Art of Design Thinking, Arun Jain
2. Don Norman ,The Design of Everyday Things, MIT Press, 2013
3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and inspires innovation, Harper Collins Publishers Ltd, New York, First Edition, 2009.

**REFERENCES:**

1. Chrisitan Mueller-Roterberg, Handbook of Design Thinking – Tips & Tools for how to design thinking, kindle Direct Publishing, First Edition, 2018.
2. Johnny Schneider, Understanding Design Thinking, Lean and Agile, O'Reilly Media, California, First Edition, 2017
3. Roger Martin, The Design of Business, Why Design Thinking is the next competitive advantage, Harvard Business Press, United States, First Edition, 2009.
4. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, New Jersey, First Edition,2013.

**Mapping of COs with POs and PSOs**

| COs / POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1       | 3   | 3   | 2   | 2   | 2   | 2   | 2   | 3   | 2   | 3    | 3    | 3    | 1    |
| CO2       | 3   | 3   | 2   | 2   | 2   | 2   | 2   | 3   | 2   | 3    | 3    | 3    | 1    |
| CO3       | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 3   | 2   | 3    | 3    | 3    | 1    |
| CO4       | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 3   | 2   | 3    | 3    | 3    | 1    |
| CO5       | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 3   | 2   | 3    | 3    | 3    | 1    |
| Avg.      | 3   | 3   | 3   | 2.6 | 2.6 | 2   | 2   | 3   | 2   | 3    | 3    | 3    | 1    |

1-low, 2-medium, 3-high

| 24GET29   | TAMILS AND TECHNOLOGY  | Category | L | T | P | C                      |             |
|---|--|----------|---|---|---|------------------------|-------------|
|   |  | HSMC     | 1 | 0 | 0 | 1                      |             |
| <b>(Common to All Branches)</b>   |  |          |   |   |   |                        |             |
| <b>UNIT - I</b>   | <b>WEAVING AND CERAMIC TECHNOLOGY</b>  |          |   |   |   |                        | <b>(03)</b> |
| Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.   |  |          |   |   |   |                        |             |
| <b>UNIT - II</b>  | <b>DESIGN AND CONSTRUCTION TECHNOLOGY</b>  |          |   |   |   |                        | <b>(03)</b> |
| Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram– Sculptures and Temples of Mamallapuram– Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple) – ThirumalaiNayakar Mahal –Chetti Nadu Houses, Indo –Saracenic architecture at Madras during British Period. |  |          |   |   |   |                        |             |
| <b>UNIT - III</b>   | <b>MANUFACTURING TECHNOLOGY</b>  |          |   |   |   |                        | <b>(03)</b> |
| Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel – Copper and gold – Coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads –Terracotta beads –Shell beads/ bone beats – Archeological evidences – Gem stone types described in Silappathikaram.  |  |          |   |   |   |                        |             |
| <b>UNIT - IV</b>  | <b>AGRICULTURE AND IRRIGATION TECHNOLOGY</b>   |          |   |   |   |                        | <b>(03)</b> |
| Dam, Tank, ponds, Sluice, Significance of KumizhiThoomp of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.   |  |          |   |   |   |                        |             |
| <b>UNIT - V</b>   | <b>SCIENTIFIC TAMIL &amp; TAMIL COMPUTING</b>  |          |   |   |   |                        | <b>(03)</b> |
| Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.   |  |          |   |   |   |                        |             |
| <b>Total : 15 Periods</b>   |  |          |   |   |   |                        |             |
| <b>COURSE OUTCOMES :</b>  |  |          |   |   |   | <b>Cognitive Level</b> |             |
| <b>At the end of the course, the students will be able to:</b>  |  |          |   |   |   |                        |             |
| CO1   | Understand the weaving and ceramic technology of ancient Tamil People nature.  |          |   |   |   | Understand             |             |
| CO2   | Comprehend the construction technology, building materials in sangam Period and case studies.                                |          |   |   |   | Understand             |             |
| CO3   | Infer the metal process, coin and beads manufacturing with relevant archeological evidence                                   |          |   |   |   | Understand             |             |
| CO4   | Realize the agriculture methods, irrigation technology and pearl diving.   |          |   |   |   | Understand             |             |
| CO5   | Apply the knowledge of scientific Tamil and Tamil computing.   |          |   |   |   | Apply                  |             |
| <b>Text Books :</b>   |  |          |   |   |   |                        |             |
| 1   | Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)                                |          |   |   |   |                        |             |
| 2   | Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies). |          |   |   |   |                        |             |

**Reference Books :**

- 1 Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
- 2 The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies).
- 3 Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology &Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
- 4 Studies in the History of India with Special Reference to Tamilnadu (dr.K.K.Pillay) (Published by : The Author)

**Mapping of COs with POs and PSOs**

| CO             | Course Outcomes  | Programme Outcomes |     |     |     |     |          |          |     |          |      |          |      |      |
|----------------|--|--------------------|-----|-----|-----|-----|----------|----------|-----|----------|------|----------|------|------|
|                |  | PO1                | PO2 | PO3 | PO4 | PO5 | PO6      | PO7      | PO8 | PO9      | PO10 | PO11     | PSO1 | PSO2 |
| CO1            | Understand the weaving and ceramic technology of ancient TamilPeople nature.                 | -                  | -   | -   | -   | -   | 3        | 3        | -   | 2        | -    | 3        | -    | -    |
| CO2            | Comprehend the construction technology, building materials in sangamPeriod and case studies. | -                  | -   | -   | -   | -   | 3        | 3        | -   | 2        | -    | 3        | -    | -    |
| CO3            | Infer the metal process, coin and beads manufacturing with relevantarcheological evidence    | -                  | -   | -   | -   | -   | 3        | 3        | -   | 2        | -    | 3        | -    | -    |
| CO4            | Realize the agriculture methods, irrigation technology and pearl diving.                     | -                  | -   | -   | -   | -   | 3        | 3        | -   | 2        | -    | 3        | -    | -    |
| CO5            | Apply the knowledge of scientific Tamil and Tamil computing.                                 | -                  | -   | -   | -   | -   | 3        | 3        | -   | 2        | -    | 3        | -    | -    |
| <b>Average</b> |  | -                  | -   | -   | -   | -   | <b>3</b> | <b>3</b> | -   | <b>2</b> | -    | <b>3</b> | -    | -    |

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

| 24GET29  | தமிழரும் தொழில் நுட்பமும்  | Category    | L | T | P | C               |
|--|--|-------------|---|---|---|-----------------|
|  |  | HSMC        | 1 | 0 | 0 | 1               |
| <b>(அனைத்து துறைகளுக்கும் பொதுவானது)</b>   |  |             |   |   |   |                 |
| <b>அலகு - I</b>  | <b>நெசவு மற்றும் பாணைத் தொழில்நுட்பம்</b>  | <b>(03)</b> |   |   |   |                 |
| சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில் நுட்பம் கருப்பு சிவப்பு பாண்டங்கள்- பாண்டகளில் கீறல் குறியீடுகள்   |  |             |   |   |   |                 |
| <b>அலகு - II</b>   | <b>வடிவமைப்பு மற்றும் கட்டிடத் தொழில் நுட்பம்</b>  | <b>(03)</b> |   |   |   |                 |
| சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும்- சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும்-சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்கர் காலக் கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டி நாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னை இந்தோ-சாரோ செனிக் கட்டிடக் கலை. |  |             |   |   |   |                 |
| <b>அலகு - III</b>  | <b>உற்பத்தித் தொழில் நுட்பம்</b>   | <b>(03)</b> |   |   |   |                 |
| கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு-வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல்-மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள் - கண்ணாடி மணிகள் - சுடு மண்மணிகள்-சங்குமணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.  |  |             |   |   |   |                 |
| <b>அலகு - IV</b>   | <b>வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்</b>  | <b>(03)</b> |   |   |   |                 |
| அணை, ஏரி, குளங்கள், மதகு - சோழர் கால குமிழித்தாம்பின் முக்கியத்துவம்-கால் நடைபராமரிப்பு - கால் நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல் சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.   |  |             |   |   |   |                 |
| <b>அலகு - V</b>  | <b>அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்</b>   | <b>(03)</b> |   |   |   |                 |
| அறிவியல் தமிழின் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின் பதிப்பு செய்தல் -தமிழ் மென் பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம்-இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.   |  |             |   |   |   |                 |
| <b>Total : 15 Periods</b>  |  |             |   |   |   |                 |
| <b>பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்</b>   |  |             |   |   |   | அறிவாற்றல் நிலை |
| CO1  | சங்ககாலத் தமிழிர்களின் நெசவு மற்றும் பாணை வனைதல் தொழில் நுட்பம் குறித்து கற்றுணர்தல்                           |             |   |   |   | புரிதல்         |
| CO2  | சங்ககாலத் தமிழிர்களின் கட்டிட தொழில்நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு |             |   |   |   | புரிதல்         |
| CO3  | சங்ககாலத் தமிழிர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு        |             |   |   |   | புரிதல்         |
| CO4  | சங்ககாலத் தமிழிர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு                    |             |   |   |   | புரிதல்         |
| CO5  | நவீன அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் குறித்த புரிந்து கொள்ளலும் மற்றும் பயன்படுத்தலும்                     |             |   |   |   | பகுப்பாய்வு     |
| <b>Text Books :</b>  |  |             |   |   |   |                 |
| 1 தமிழக வரலாறு- மக்களும் பண்பாடும்- கே.கே.பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)   |  |             |   |   |   |                 |
| 2 கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)  |  |             |   |   |   |                 |
| <b>Reference Books :</b>   |  |             |   |   |   |                 |
| 1 கீழடி - வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.   |  |             |   |   |   |                 |

|   |  |
|---|--|
|   | ( தொல்லியல் துறை வெளியீடு)   |
| 2 | பொருறை – ஆற்றங்கரை நாகரிகம் ( தொல்லியல் துறை வெளியீடு)   |
| 3 | Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by : The Author)                             |
| 4 | Porunai Civilization (Jointly Published by: Department of Archaeology &Tamil Nadu Textbook and Educational Services Corporation, Tamil Nadu) |

| Mapping of COs with POs and PSOs |  |                    |     |     |     |     |     |     |     |     |      |      |      |      |
|----------------------------------|--|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO                               | Course Outcomes  | Programme Outcomes |     |     |     |     |     |     |     |     |      |      |      |      |
|                                  |  | PO1                | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
| CO1                              | சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வளைதல் தொழில் நுட்பம் குறித்து கற்றுணர்தல்                            | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO2                              | சங்ககாலத் தமிழர்களின் கட்டிட தொழில் நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO3                              | சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு         | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO4                              | சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு                     | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| CO5                              | நவீன அறிவியல் தமிழ் மற்றும் கன்னிதமிழ் குறித்த புரிந்து கொள்ளலும் மற்றும் பயன்படுத்தலும்                       | -                  | -   | -   | -   | -   | 3   | 3   | -   | 2   | -    | 3    | -    | -    |
| Average                          |  | -                  | -   | -   | -   | -   | -   | 3   | 3   | -   | 2    | -    | -    | -    |

1. சிறிது (குறைந்த)

2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)

| 24MAI29   | PROBABILITY AND STATISTICS                | Category | L | T | P | C          |
|---|---|----------|---|---|---|------------|
|   |   | BSC      | 2 | 1 | 2 | 4          |
| <b>(Common to All Branches)</b>   |   |          |   |   |   |            |
| <b>PREREQUISITE:</b>  |   |          |   |   |   |            |
| The students should know the fundamental knowledge on probability, integration, measures of central tendency and dispersion, graphical representation of given data and basic computer knowledge.   |   |          |   |   |   |            |
| <b>OBJECTIVES:</b>  |   |          |   |   |   |            |
| <ul style="list-style-type: none"> <li>• To understand the basic concepts of probability and random variables.</li> <li>• To provide the skills on the two dimensional random variables in solving engineering problems.</li> <li>• To develop the skills of testing of hypothesis for small and large samples.</li> <li>• To introduce the basic concepts of classifications of design of experiments.</li> <li>• To acquire the knowledge on statistical quality control.</li> </ul>  |   |          |   |   |   |            |
| <b>UNIT - I</b>   | <b>ONE DIMENSIONAL RANDOM VARIABLES</b>   |          |   |   |   | <b>(9)</b> |
| One dimensional Random Variable - Discrete and continuous random Variables -Expectations - Moment generating functions and their properties - Binomial, Poisson, Uniform and Normal distributions.  |   |          |   |   |   |            |
| <b>UNIT - II</b>  | <b>TWO - DIMENSIONAL RANDOM VARIABLES</b> |          |   |   |   | <b>(9)</b> |
| Joint distributions – Marginal and conditional distributions – Covariance – Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Regression Analysis.  |   |          |   |   |   |            |
| <b>UNIT - III</b>   | <b>TESTING OF HYPOTHESIS</b>              |          |   |   |   | <b>(9)</b> |
| One sample and two sample test for means of large samples (Z- test), One sample and two sample test for means of small samples (t-test), Chi-square - Independent of Attributes - F test for equality of variances.   |   |          |   |   |   |            |
| <b>UNIT - IV</b>  | <b>DESIGN OF EXPERIMENTS</b>              |          |   |   |   | <b>(9)</b> |
| Analysis of variance - One way and two way classifications - Completely Randomized Design - Randomized Block Design - Latin Square Design.  |   |          |   |   |   |            |
| <b>UNIT - V</b>   | <b>STATISTICAL QUALITY CONTROL</b>        |          |   |   |   | <b>(9)</b> |
| Control charts for measurements ( $\bar{X}$ and R charts) – Control charts for C and P charts – Acceptance sampling for construction of an OC curve.  |   |          |   |   |   |            |
| <b>List of Exercise/Experiments (R Software):</b>   |   |          |   |   |   |            |
| <ol style="list-style-type: none"> <li>1. Determine the probability by using binomial distribution.</li> <li>2. Find the probability with the help of normal distribution.</li> <li>3. Determine the correlation co-efficient between X and Y.</li> <li>4. Calculate and plot the regression lines.</li> <li>5. Test the significance of difference between experimental and theoretical values of the data by using chi-square test.</li> <li>6. Examine the small samples using F distribution.</li> <li>7. Analyze the data using Randomized Block Design (RBD).</li> <li>8. Inspect the data using Latin Square Design (LSD).</li> <li>9. Find the <math>\bar{X}</math> and R charts.</li> <li>10. Compute c and p charts.</li> </ol> |   |          |   |   |   |            |
| <b>Lecture:45 Laboratory:30 TOTAL: 75 PERIODS</b>   |   |          |   |   |   |            |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome   | Cognitive Level |
|-----|--|-----------------|
| CO1 | Illustrate the fundamental concepts of probability and standard distributions in real life phenomenon. | Understand      |
| CO2 | Solve engineering problems by applying the concepts of two-dimensional random variables.               | Understand      |
| CO3 | Apply the concept of testing of hypothesis for small and large samples in mean and variance.           | Apply           |
| CO4 | Analyze the various statistical methods in Analysis of Variance.                                       | Analyze         |
| CO5 | Apply the quality control methods to design control charts.  | Apply           |

**TEXT BOOKS:**

1. S.P. Gupta, "Statistical Methods", Sulthan Chand & Sons, 46<sup>th</sup> Edition ,2021.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4<sup>th</sup>edition, 2007.

**REFERENCES:**

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
2. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9<sup>th</sup> Edition, 2010.
4. R.C.Gupta, "Statistical Quality Controls", Khanna Publishers, Delhi, 8<sup>th</sup> Edition , 2008.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | 1   | -    | 1    | 2    | -    |
| CO2         | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | 1   | -    | 1    | 2    | -    |
| CO3         | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | 1   | -    | 1    | 2    | -    |
| CO4         | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | 1   | -    | 1    | 2    | -    |
| CO5         | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | 1   | -    | 1    | 2    | -    |
| Avg.        | 3   | 3   | 3   | 3   | 2   | -   | -   | -   | 1   | -    | 1    | 2    | -    |

1-low, 2-medium, 3-high



| 24PHI07   | ENGINEERING PHYSICS                           | Category   | L | T | P | C |
|---|---|------------|---|---|---|---|
|   |   | BSC        | 3 | 0 | 2 | 4 |
| (Common to BME,CSE, CSD, CSE(IoT),CS,ECE,EEE&IT)  |   |            |   |   |   |   |
| <b>PREREQUISITE:</b><br>The students must have knowledge about basic concepts of light sources, dual nature of radiation, conductivity of metals and semiconducting materials, different types of magnetic materials, super conducting materials and their applications.  |   |            |   |   |   |   |
| <b>OBJECTIVES:</b> <ul style="list-style-type: none"> <li>• To enrich with widen knowledge on laser and fibre technology.</li> <li>• To explore the basic concepts of quantum mechanics.</li> <li>• To emphasis the properties of conducting materials.</li> <li>• To comprehend the fundamental concepts of semiconducting material to impart it for device fabrication.</li> <li>• To formalize the different types of magnetic material and its applications in the field of engineering.</li> </ul>   |   |            |   |   |   |   |
| <b>UNIT – I</b>   | <b>LASER AND FIBRE OPTICS</b>                 | <b>(9)</b> |   |   |   |   |
| <p><b>Lasers:</b> Principles of spontaneous emission and stimulated emission - Einstein's co-efficients A &amp; B– population inversion – molecular beam laser (CO<sub>2</sub>) –homo – junction &amp; hetero – junction semiconductor lasers (qualitative analysis only)– applications.</p> <p><b>Fibre Optics:</b> propagation of light in optical fibre– numerical aperture and acceptance angle – types of optical fibre (materials, refractive index profile, and modes of propagation) – applications - fibre optic sensors: pressure and displacement sensors.</p> |   |            |   |   |   |   |
| <b>UNIT – II</b>  | <b>QUANTUM MECHANICS</b>                      | <b>(9)</b> |   |   |   |   |
| Introduction – black body radiation– Planck's theory (derivation) – deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory, Compton effect– de-Broglie's concept of matter waves – physical significance of a wave function – Schrödinger wave equations (Time dependent & time independent) – particle in a box (one dimensional).  |   |            |   |   |   |   |
| <b>UNIT – III</b>   | <b>CONDUCTING MATERIALS</b>                   | <b>(9)</b> |   |   |   |   |
| Classical free electron theory – expression for electrical conductivity – thermal conductivity – Wiedemann-Franz law – drawbacks of classical free electron theory – quantum theory – Fermi energy – Fermi -Dirac distribution function – density of states and carrier concentration of metals.  |   |            |   |   |   |   |
| <b>UNIT – IV</b>  | <b>SEMICONDUCTING MATERIALS</b>               | <b>(9)</b> |   |   |   |   |
| Introduction – Intrinsic semiconductor: carrier concentration in an intrinsic semiconductor– Fermi level of an intrinsic semiconductor– variation of Fermi energy level with temperature – Extrinsic semiconductors: carrier concentration in n– type and p-type semiconductors – Fermi level of extrinsic semiconductors– variation of Fermi energy level with temperature in an extrinsic semiconductor– Hall effect.– determination of Hall co-efficient for n– and p– type semiconductors– applications.  |   |            |   |   |   |   |
| <b>UNIT – V</b>   | <b>MAGNETIC AND SUPERCONDUCTING MATERIALS</b> | <b>(9)</b> |   |   |   |   |
| <p><b>Magnetic Materials:</b> Introduction – origin of magnetic moment – dia, para and ferromagnetic materials– domain theory of ferro-magnetism – Hysteresis – soft and hard magnetic materials.</p> <p><b>Superconducting Materials:</b> Introduction to superconductivity – properties and types of superconductor – application of superconductors: magnetic levitation– SQUIDS– cryotron.</p>  |   |            |   |   |   |   |

**List of exercises/experiments:**

1. By forming interference fringes, determine the width of one fringe and hence calculate the thickness of the given thin paper.
2. For a given optical fibre determine the acceptance angle and numerical aperture.
3. Evaluate the wave length of semiconductor laser.
4. Using semiconductor laser find the particle size of the lycopodium powder
5. Construct Carey Foster's bridge to measure the resistivity of an unknown wire.
6. Enumerate the thermal conductivity of a bad conductor by Lee's disc method.
7. Compute the band gap of an intrinsic semiconductor.
8. Draw the V-I characteristics of a solar cell and calculate its power.
9. By forming B-H curve calculate Hysteresis loss of magnetic materials.
10. Employing semiconductor laser compute the width of the groove of CD.

**Lecture: 45 Laboratory:30 TOTAL: 75 PERIODS**

**Course Outcomes:**

**At the end of the course, the students will be able to:**

| COs | Course Outcome  | Cognitive level |
|-----|---|-----------------|
| CO1 | Categorize the types of laser and optical fibre to utilize it for specific application based on their desirable requisite.                  | Analyze         |
| CO2 | Enumerate the preambles of quantum mechanics and implement its concepts to tackle the cumbersome engineering problems.                      | Apply           |
| CO3 | Comprehend the basics of conducting materials based on classical and quantum theories.  | Understand      |
| CO4 | Apply the perceived preambles of semiconductor to fabricate it for the potential applications   | Analyze         |
| CO5 | Imbibe the concepts of magnetic and superconducting phenomenon that can be applied for possible technological and engineering applications. | Apply           |

**Text Books :**

- 1 M.N. Avadhanulu and P.G. Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 11th Edition, 2018.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics", Dhanpat Rai Publication, New Delhi, 7th Edition, 2014.

**Reference Books :**

1. V. Rajendran, "Engineering Physics", Tata McGraw-Hill, New Delhi, 1st edition, 2011.
2. R. Murugesan and KiruthigaSivaprasath, "Modern Physics", S. Chand & Company, New Delhi, 7th Edition, 2014.
3. Charles Kittel, "Introduction to Solid State Physics", John Wiley & Sons, India, 7th Edition, 2008.
4. ArthurBeiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw- Hill, New Delhi, 7th Edition, 2015.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO<br>6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|---------|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 2   | -   | -   | 2   | -       | 1   | -   | 2   | -    | 2    | -    | -    |
| CO2         | 3   | 2   | -   | -   | 2   | -       | 1   | -   | 2   | -    | 2    | -    | -    |
| CO3         | 3   | 2   | -   | -   | 2   | -       | -   | -   | 2   | -    | 2    | -    | -    |
| CO4         | 3   | 2   | -   | -   | 2   | -       | 1   | -   | 2   | -    | 2    | -    | -    |
| CO5         | 3   | 2   | -   | -   | 2   | -       | 1   | -   | 2   | -    | 2    | -    | -    |
| Avg.        | 3   | 2   | -   | -   | 2   | -       | 1   | -   | 2   | -    | 2    | -    | -    |

1-low, 2-medium, 3-high

| 24ECI26  | DIGITAL PRINCIPLES AND SYSTEM DESIGN   | Category   | L | T | P | C |
|--|--|------------|---|---|---|---|
|  |  | PCC        | 3 | 0 | 2 | 4 |
| <b>PREREQUISITE:</b><br>Students should have a basic understanding of electrical circuits, introductory programming knowledge and familiarity with digital electronics, particularly binary numbers and logic gates. Additionally, students should have a solid foundation in algebra and discrete mathematics, with an emphasis on Boolean algebra.   |  |            |   |   |   |   |
| <b>OBJECTIVES:</b>   |  |            |   |   |   |   |
| <ul style="list-style-type: none"> <li>To equip students with the ability to apply Boolean theorems and techniques and simplification of Boolean functions using Karnaugh Map and Tabulation method.</li> <li>To develop the analytical and design skills necessary for creating combinational logic circuits, including components like adders, subtractors, and multiplexers.</li> <li>To provide insights on the design and analysis of synchronous sequential circuits, emphasizing the use of latches, flip-flops, shift registers, and counters.</li> <li>To make the students to design arithmetic and logic circuits.</li> <li>To foster the capability to design simple computer architectures and implement these designs using Hardware Description Language (HDL) for both combinational and sequential logic circuits.</li> </ul> |  |            |   |   |   |   |
| <b>UNIT - I</b>  | <b>BOOLEAN ALGEBRA AND LOGIC GATES</b> | <b>(9)</b> |   |   |   |   |
| Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map and Tabulation Methods – Logic Gates.  |  |            |   |   |   |   |
| <b>UNIT - II</b>   | <b>COMBINATIONAL LOGIC</b>             | <b>(9)</b> |   |   |   |   |
| Combinational Circuits – Analysis and Design Procedures – Adder and Subtractor – Magnitude Comparator – Code Conversions – Decoders and Encoders – Multiplexers and Demultiplexers.  |  |            |   |   |   |   |
| <b>UNIT - III</b>  | <b>SYNCHRONOUS SEQUENTIAL LOGIC</b>    | <b>(9)</b> |   |   |   |   |
| Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters.   |  |            |   |   |   |   |
| <b>UNIT - IV</b>   | <b>PROCESSOR DESIGN</b>                | <b>(9)</b> |   |   |   |   |
| Processor Organization – Design of ALU: Arithmetic Circuits – Logic Circuits – Arithmetic Logic Unit – Status Register – Design of Shifter – Processor Unit.   |  |            |   |   |   |   |
| <b>UNIT - V</b>  | <b>SIMPLE COMPUTER DESIGN AND HDL</b>  | <b>(9)</b> |   |   |   |   |
| Inter Register Transfer – Conditional Control Statements – Instruction Codes – Design of a Simple Computer – Hardware Description Language (HDL) for Combinational Circuits and Sequential Logic Circuits.   |  |            |   |   |   |   |
| <b>LIST OF EXPERIMENTS:</b>  |  |            |   |   |   |   |
| <ol style="list-style-type: none"> <li>Verification of Boolean theorems using logic gates.</li> <li>Design and implementation of combinational circuits using logic gates for arbitrary functions, Code Converters.</li> <li>Design and implementation of combinational circuits using MSI devices: <ol style="list-style-type: none"> <li>4 - bit binary adder / subtractor</li> <li>Parity generator / checker</li> <li>Multiplexers and De-Multiplexers</li> </ol> </li> <li>Design and implementation of sequential circuits: <ol style="list-style-type: none"> <li>Shift-registers</li> <li>Synchronous counter</li> </ol> </li> <li>HDL Models for coding combinational / sequential circuits.</li> </ol>   |  |            |   |   |   |   |
| <b>Total :75 PERIODS</b>   |  |            |   |   |   |   |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

|     |   |       |
|-----|---|-------|
| CO1 | Apply Boolean theorems and techniques, Karnaugh Map and Tabulation method for simplifying Boolean functions.            | Apply |
| CO2 | Develop skills to design and analyze combinational logic circuits, including adders, subtractors, and multiplexers.     | Apply |
| CO3 | Design synchronous sequential circuits using latches, flip-flops.   | Apply |
| CO4 | Design processors which include arithmetic and logic circuits.  | Apply |
| CO5 | Design simple computer architectures and implement them using HDL for both combinational and sequential logic circuits. | Apply |

**TEXT BOOKS:**

- 1 Morris Mano, M., "Digital Logic and Computer Design", Prentice-hall of India private limited, First Edition, 2016.
- 2 John F. Wakerly, "Digital Design Principles and Practices", Pearson Education, Fourth Edition, 2008.

**REFERENCES:**

- 1 Charles H. Roth Jr, "Fundamentals of Logic Design", Jaico Publishing House, Fifth Edition, 2003.
- 2 Kharate, G.K., "Digital Electronics", Oxford University Press, First Edition, 2012.
- 3 Morris Mano, M., and Michael D. Ciletti, "Digital Design", Pearson Education, Fifth Edition, 2013.
- 4 Donald D. Givone, "Digital Principles and Design", Tata Mcgraw Hill, First Edition, 2003.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -    | 3    | 3    | -    |
| CO2         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | 3    | 3    | -    |
| CO3         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | 3    | 3    | -    |
| CO4         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | 3    | 3    | -    |
| CO5         | 3   | 3   | 3   | -   | 3   | -   | -   | -   | -   | -    | 3    | 3    | -    |
| Avg.        | 3   | 3   | 2.4 | -   | 3   | -   | -   | -   | -   | -    | 3    | 3    | -    |

1-low, 2-medium, 3-high

| 24ENP29  | PROFESSIONAL COMMUNICATION<br>LABORATORY | Category | L | T | P | C          |
|--|--|----------|---|---|---|------------|
|  |  | HSMC     | 0 | 0 | 2 | 1          |
| <b>(Common to All Branches)</b>  |  |          |   |   |   |            |
| <b>PREREQUISITE:</b><br>Students having prior knowledge from the Professional Communication course with a solid base of LSRW skills are the prerequisites for the course.  |  |          |   |   |   |            |
| <b>OBJECTIVES:</b>   |  |          |   |   |   |            |
| <ul style="list-style-type: none"> <li>• To provide self-paced learning to consolidate their understanding of advanced grammar and vocabulary Methods</li> <li>• To equip the students with the required LSRW skills to handle advanced communication situations in English</li> <li>• To make learners to speak in simple sentences without any hesitation</li> <li>• To facilitate learners to draft basic formal written communication</li> <li>• To provide audio and video support to ensure meaningful skill acquisition</li> </ul>  |  |          |   |   |   |            |
| <b>UNIT - I</b>  | <b>GRAMMAR</b>                           |          |   |   |   | <b>(6)</b> |
| Types of Sentences – Tenses & Voice- Concord – Auxiliary-Infinitive – Article-preposition – Comparative and Superlative adjective. Discourse Markers –Linkers: sequential – past time (later) Connecting words expressing cause and effect, contrast. Markers to structure informal spoken discourse Verb forms WH- and Yes/No Questions in present / past Complex question tags Broader range of intensifiers; So, such, too, enough, connecting words expressing cause and effect, contrast.   |  |          |   |   |   |            |
| <b>UNIT – II</b>   | <b>LISTENING</b>                         |          |   |   |   | <b>(6)</b> |
| Short conversations / monologues: numbers and spelling (dates, prices, percentages, figures, etc.) and locate specific information, longer monologue and note taking – gap filling, Understanding the gist and extracting main idea. Conversation between two employees – Description of gadgets – Enquiring about orders and deliveries – Chasing an order: Telephone Conversations – Radio Interview – Voicemail messages and phone conversations – Welcome speech at a conference – Statistical information.  |  |          |   |   |   |            |
| <b>UNIT – III</b>  | <b>SPEAKING</b>                          |          |   |   |   | <b>(6)</b> |
| Talking about oneself, agreeing and disagreeing, expressing preferences-mini-presentation on a business theme (Oral) - Giving information and expressing opinions- discussion on business-related topics - Helping students in achieving clarity and fluency; manipulating paralinguistic features of speaking (voice modulation, pitch, tone stress, effective pauses) Conducting Task oriented interpersonal, informal and semiformal Speaking / Classroom Presentation - Teaching strategies for Group Discussion - Teaching Cohesion and Coherence - Teaching effective communication & strategies for handling criticism and adverse remarks - Teaching strategies of Turn- taking, effective intervention, and courtesies, Role Play, Mock & HR Interview. |  |          |   |   |   |            |
| <b>UNIT - IV</b>   | <b>READING</b>                           |          |   |   |   | <b>(6)</b> |
| Short texts and understand the main message (signs, messages, postcards, notes, emails, labels) – Read and find specific information- Interpreting visual information-Comprehend detailed factual information—gather the gist- understand grammar and structure of the given passage- transferring information – Radio Commentary, Technical Texts and Case Studies – Guiding students for Intensive & Extensive Reading – Reading notices, messages, adverts, leaflets, contents pages, graphs, charts, tables, business letters, product descriptions, reports, minutes, newspaper or magazine articles, memos.  |  |          |   |   |   |            |
| <b>UNIT – V</b>  | <b>WRITING</b>                           |          |   |   |   | <b>(6)</b> |
| Internal written communication - short messages to colleagues - note, message, memo, email- External communication - letter, email, notice-set phrases for letters and e-mails-Cohesive devices - All varieties of Technical Report, Business Letters and Job Application - Punctuation & Spelling, Semantics of Connectives, Modifiers and Modals, variety of sentences and paragraphs - Organizational Communication: Memo, Notice, Circular, Agenda / Minutes   |  |          |   |   |   |            |

| <b>TOTAL = 30 PERIODS</b>  |  |                        |
|--|--|------------------------|
| <b>COURSE OUTCOMES:</b>  |  |                        |
| <b>At the end of the course, the learners will be able to:</b>   |  |                        |
| <b>COs</b>   | <b>Course Outcome</b>  | <b>Cognitive Level</b> |
| <b>CO1</b>   | Understand and apply the basic grammar and learn the range of vocabulary                         | Understand             |
| <b>CO2</b>   | Listen enthusiastically and consolidate the messages and information of monologues and dialogues | Remember               |
| <b>CO3</b>   | Convey the views and opinions clearly in simple sentences  | Apply                  |
| <b>CO4</b>   | Read and comprehend the statistics and texts with clear understanding                            | Analyse                |
| <b>CO5</b>   | Write the contexts relevant to the topics efficiently.   | Understand             |
| <b>TEXT BOOKS:</b>   |  |                        |
| 1. Whitby Norman, Business Benchmark Pre-Intermediate to Intermediate Student's Book CUP Publications, 3 <sup>rd</sup> Edition, 2018 |  |                        |
| 2. Wood Ian, Williams Anne, Cowper Anna, Pass BEC Preliminary, Cengage Learning, 2 <sup>n</sup> Edition, 2015.                       |  |                        |
| <b>REFERENCES:</b>   |  |                        |
| 1. BEC Preliminary – Cambridge Handbook for Language Teachers, 2 <sup>nd</sup> Edition, CUP 2000.                                    |  |                        |
| 2. Hewings Martin – Advanced grammar in use- Upper-Intermediate Proficiency, CUP, 3 <sup>rd</sup> Edition, 2013.                     |  |                        |

| <b>Mapping of COs with POs and PSOs</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |             |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|
| <b>COs/<br/>POs</b>                     | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PO11</b> | <b>PSO1</b> | <b>PSO2</b> | <b>PSO3</b> |
| CO1                                     | 2          | -          | -          | -          | -          | -          | -          | 2          | 3          | -           | -           | -           | -           | -           |
| CO2                                     | 2          | -          | -          | -          | -          | -          | -          | 2          | 3          | -           | -           | -           | -           | -           |
| CO3                                     | 2          | -          | -          | -          | -          | -          | 1          | 2          | 3          | -           | -           | -           | -           | -           |
| CO4                                     | 2          | -          | -          | -          | -          | -          | 1          | -          | 3          | -           | -           | -           | -           | -           |
| CO5                                     | 2          | -          | -          | -          | -          | -          | 1          | -          | 3          | -           | -           | -           | -           | -           |
| Avg.                                    | <b>2</b>   | -          | -          | -          | -          | -          | <b>1</b>   | <b>2</b>   | <b>3</b>   | -           | -           | -           | -           | -           |
| 1-low, 2-medium, 3-high                 |            |            |            |            |            |            |            |            |            |             |             |             |             |             |

| 24CSP29  | PYTHON PROGRAMMING LABORATORY | Category | L | T | P | C |
|--|-------------------------------|----------|---|---|---|---|
|  |                               | ESC      | 0 | 0 | 2 | 1 |
| <b>(Common to All Branches)</b>  |                               |          |   |   |   |   |
| <b>PREREQUISITE:</b>   |                               |          |   |   |   |   |
| Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.   |                               |          |   |   |   |   |
| <b>OBJECTIVES:</b>   |                               |          |   |   |   |   |
| <ul style="list-style-type: none"> <li>• To perform operations like reversing, palindrome checking, and character replacement.</li> <li>• To utilize functions for computing mathematical calculations and solve specific problems.</li> <li>• To impart knowledge on conditionals and loops to address various problem-solving scenarios.</li> <li>• To explore sets and dictionaries for sorting, searching, and removing duplicates in data.</li> <li>• To acquire knowledge in polymorphism, exception handling, GUI design, and web development.</li> </ul>   |                               |          |   |   |   |   |
| <b>List of Exercise/Experiments:</b>   |                               |          |   |   |   |   |
| <ol style="list-style-type: none"> <li>1. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)</li> <li>2. Implementing programs using Functions (GCD of two numbers, Factorial)</li> <li>3. Scientific problems using conditional statements and loops. (Largest among three numbers, Number series, Number Patterns)</li> <li>4. Implementing real-time applications using Sets, Dictionaries (Sorting, Searching, Remove Duplicates)</li> <li>5. Implementing real-time/technical applications using Lists, Tuples. (Swapping two elements, Reversing a List / Sorting Tuples)</li> <li>6. Create a Python program to demonstrate polymorphism with inheritance. (Single, Multilevel Inheritance, Hierarchical)</li> <li>7. Implement a simple calendar in python program without using the calendar module using string array or list.</li> <li>8. Write a program to demonstrate the user-defined exception handling mechanism in Python.</li> <li>9. Design and implement a graphical user interface to perform any arithmetic operation.</li> <li>10. Implementing a web application with MySQL database integration for CRUD operations (Flask / Django Framework)</li> </ol> |                               |          |   |   |   |   |
| <b>TOTAL: 30 PERIODS</b>   |                               |          |   |   |   |   |

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

| COs | Course Outcome  | Cognitive Level |
|-----|---|-----------------|
| CO1 | Design simple programs using conditional statements and loops.                                  | Apply           |
| CO2 | Demonstrate the functions to perform mathematical calculations and solve specific problems.     | Apply           |
| CO3 | Apply conditional and looping statements to solve problems.                                     | Apply           |
| CO4 | Apply sets and dictionaries for sorting, searching, and removing duplicates.                    | Apply           |
| CO5 | Implement polymorphism, manage exceptions, develop GUIs, and build web applications with MySQL. | Apply           |

**REFERENCES:**

1. Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, 5th Edition, 2023.
2. Wesley J.Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2017.

**Mapping of COs with POs and PSOs**

| COs/<br>POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1         | 2   | 3   | 3   | 2   | 2   | 2   | -   | -   | 1   | -   | -    | 1    | 3    | 2    |
| CO2         | 3   | 3   | 3   | 2   | 2   | 3   | -   | -   | 1   | -   | -    | 1    | 3    | 2    |
| CO3         | 3   | 3   | 3   | 2   | 2   | 3   | -   | -   | 1   | -   | -    | 1    | 3    | 2    |
| CO4         | 3   | 3   | 3   | 1   | 3   | 3   | -   | -   | 1   | -   | -    | 1    | 3    | 2    |
| CO5         | 3   | 3   | 3   | 1   | 3   | 3   | -   | -   | 1   | -   | -    | 1    | 3    | 2    |
| Avg.        | 2.8 | 3   | 3   | 1.6 | 2.4 | 2.8 | -   | -   | 1   | -   | -    | 1    | 3    | 2    |

1-low, 2-medium, 3-high



| 24SSP29   | APTITUDE AND CODING SKILL –II   | Category | L | T | P | C               |
|---|---|----------|---|---|---|-----------------|
|   |   | EEC      | 2 | 0 | 2 | 1               |
| <b>(Common to All Branches)</b>   |   |          |   |   |   |                 |
| <b>OBJECTIVES:</b>  |   |          |   |   |   |                 |
| <b>The Course will enable the learners :</b>  |   |          |   |   |   |                 |
| <ul style="list-style-type: none"> <li>• To expose to various concept of Aptitude problem solving</li> <li>• To solve the problem and to improve analytical skill based on company specific skill</li> <li>• To develop proficiency in verbal reasoning for improved critical thinking.</li> <li>• To build and enrich the communication skills</li> <li>• To Apply fundamental Python programming concepts, including variables, data types, control structures, and functions, to solve basic computational problems effectively</li> </ul> |   |          |   |   |   |                 |
| <b>UNIT - I</b>   | <b>NUMBERS AND SHARE BASED CONCEPTS</b>   |          |   |   |   | (12)            |
| Problems on Numbers – Unit Digits – Squares and Cubes – Remainder Theorem – Averages - Ratio Proportions and Partnership – Percentage – Profit and Loss   |   |          |   |   |   |                 |
| <b>UNIT - II</b>  | <b>BASICS OF WORK BASED CONCEPTS</b>  |          |   |   |   | (6)             |
| Introduction to time and work –Introduction to Time, Speed and Distance, Problems on Trains   |   |          |   |   |   |                 |
| <b>UNIT - III</b>   | <b>LOGICAL REASONING</b>  |          |   |   |   | (6)             |
| Blood Relations – Ranking and Ordering – Inequalities – Cause and Effect  |   |          |   |   |   |                 |
| <b>UNIT - IV</b>  | <b>VERBAL ABILITY</b>   |          |   |   |   | (9)             |
| Yes or No and “WH” Questions – Conjunctions – Count / Uncounted Nouns – Direct and Indirect Speech – Active and Passive Voice   |   |          |   |   |   |                 |
| <b>UNIT - V</b>   | <b>PYTHON PROGRAMMING FUNDAMENTALS</b>  |          |   |   |   | (12)            |
| Introduction-Features-Environment setup; Basic syntax: variable-data types-operators-control statements-if-if-else- loop-break-continue, etc. List- operations on list; String operations- access; Tuple: operations on tuple; Dictionaries: Accessing dictionaries, working with dictionaries; Functions-Exception Handling-Input & Output-Modules-OOPs concepts-Numerical Programming.  |   |          |   |   |   |                 |
| <b>TOTAL: 30 PERIODS</b>  |   |          |   |   |   |                 |
| <b>COURSE OUTCOMES:</b>   |   |          |   |   |   |                 |
| <b>At the end of the course, the students will be able to:</b>  |   |          |   |   |   |                 |
| COs   | Course Outcome  |          |   |   |   | Cognitive Level |
| CO1   | Develop problem-solving skills and identify optimal solutions efficiently.                        |          |   |   |   | Understanding   |
| CO2   | Solve problems on quantitative aptitude   |          |   |   |   | Applying        |
| CO3   | Resolve problems with logical reasoning   |          |   |   |   | Applying        |
| CO4   | Develop proficiency in verbal and communication for improved and effective articulation of ideas. |          |   |   |   | Applying        |
| CO5   | Implement Python coding by utilizing appropriate data structures.                                 |          |   |   |   | Applying        |
| <b>TEXT BOOKS:</b>  |   |          |   |   |   |                 |
| <ol style="list-style-type: none"> <li>1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.</li> <li>2. R.S. Aggarwal, A Modern Approach to Verbal &amp; Non-Verbal Reasoning .</li> <li>3. Wren &amp; Martin, High School English Grammar &amp; Composition</li> <li>4. Allen B. Downey, Think Python: How to Think like a Computer Scientist, 2<sup>nd</sup> Edition, O’Reilly Publishers, 2016</li> </ol>  |   |          |   |   |   |                 |

5. Karl Beecher, Computational Thinking: A Beginner's Guide to Problem Solving and Programming, 1<sup>st</sup> Edition, BCS Learning & Development Limited, 2017.

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Education, 1<sup>st</sup> Edition, 2021.
2. Martin C. Brown, Python: The Complete Reference, 4<sup>th</sup> Edition, Mc-Graw Hill, 2018.
3. <https://www.python.org/>

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high