

# Curriculum and Syllabi Regulation 2023

## **B.E Computer Science and Engineering**

Applicable for 2023 Admitted students



## **Vision and Mission of the Institution**

### **Vision**

- ✚ To be leading Institution in Academic excellence, Multidisciplinary Research, Innovation, Entrepreneurship and Industry relation in order to mould true citizens of the country

### **Mission**

- ✚ To create innovative and vibrant young leaders in Engineering and Technology field for building India as a knowledge power by improving the teaching-learning process
- ✚ To enhance employability, entrepreneurship and to improve the research competence to address Societal needs.
- ✚ To generate engineering graduates who use knowledge as a powerful tool to drive societal transformation and inculcate in them ethical and moral values.

## **DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

### **Vision**

- ✚ To become a School of Computing excellence in research and innovation by imparting industry driven Teaching Learning Process.

### **Mission**

- ✚ To inculcate an innovator by adopting student-centric, activity and outcome-based teaching learning process in diversified areas of Computer Science and Engineering.
- ✚ To achieve global standards with technical transformations in education and value based living through a social and scientific approach.
- ✚ To groom graduates with all-round leadership qualities, team spirit to meet the requirements of industry, business and society.

## Program Educational Objectives (PEOs)

The Computer Science and Engineering graduate can

PEO 1: Apply their technical competence in computer science to solve real world problems, with technical and people leadership.

PEO 2: Conduct cutting edge research and develop solutions on problems of social relevance.

PEO 3: Work in a business environment, exhibiting team skills, work ethics, adaptability and lifelong learning.

## Program Outcomes

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

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

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

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

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

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

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

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

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

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

**PO11: Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

### **Programme Specific Outcomes (PSOs)**

**PSO 1:** Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.

**PSO 2:** Strong theoretical foundation leading to excellence and excitement towards research, to provide elegant solutions to complex problems

**PSO 3.** Ability to work effectively with various engineering fields as a team to design, build and develop system applications.

| SEMESTER-I |             |                                     |          |                  |   |    |                       |         |
|------------|-------------|-------------------------------------|----------|------------------|---|----|-----------------------|---------|
| S. No.     | COURSE CODE | COURSE TITLE                        | CATEGORY | PERIODS PER WEEK |   |    | TOTAL CONTACT PERIODS | CREDITS |
|            |             |                                     |          | L                | T | P  |                       |         |
|            | U23IP101    | Induction Program                   | MC       | -                | - | -  | -                     | 0       |
| THEORY     |             |                                     |          |                  |   |    |                       |         |
| 1          | U23EN101    | English for Engineers               | HSMC     | 3                | 0 | 0  | 3                     | 3       |
| 2          | U23MA101    | Calculus and Differential Equations | BSC      | 3                | 1 | 0  | 4                     | 4       |
| 3          | U23PH101    | Engineering Physics                 | BSC      | 3                | 0 | 0  | 3                     | 3       |
| 4          | U23CY101    | Engineering Chemistry               | BSC      | 3                | 0 | 0  | 3                     | 3       |
| 5          | U23CS101    | C- Programming                      | ESC      | 3                | 0 | 0  | 3                     | 3       |
| 6          | U23HS101    | Heritage of Tamil                   | HSMC     | 1                | 0 | 0  | 1                     | 1       |
| 7          | U23EE101    | Career Enhancement Training I       | EEC      | 3                | 0 | 0  | 3                     | 1       |
| PRACTICAL  |             |                                     |          |                  |   |    |                       |         |
| 8          | U23BS111    | Basic Science Laboratory            | BSC      | 0                | 0 | 4  | 4                     | 2       |
| 9          | U23EN111    | Communicative English Laboratory    | HSMC     | 0                | 0 | 2  | 2                     | 1       |
| 10         | U23CS111    | C- Programming Laboratory           | ESC      | 0                | 0 | 4  | 4                     | 2       |
| 11         | U23VExxx    | Vocational Enhancement Training-I   | VEC      | 0                | 0 | 2  | 2                     | 1*      |
| Total      |             |                                     |          | 19               | 1 | 12 | 32                    | 23      |

| SEMESTER-II               |             |                                    |          |                  |   |    |                       |         |
|---------------------------|-------------|------------------------------------|----------|------------------|---|----|-----------------------|---------|
| S. No.                    | COURSE CODE | COURSE TITLE                       | CATEGORY | PERIODS PER WEEK |   |    | TOTAL CONTACT PERIODS | CREDITS |
|                           |             |                                    |          | L                | T | P  |                       |         |
| THEORY                    |             |                                    |          |                  |   |    |                       |         |
| 1                         | U23PH203    | Physics for Information Science    | BSC      | 3                | 0 | 0  | 3                     | 3       |
| 2                         | U23HS202    | Tamils & Technology                | HSMC     | 1                | 0 | 0  | 1                     | 1       |
| 3                         | U23CS201    | Python Programming and Practices   | ESC      | 3                | 0 | 0  | 3                     | 3       |
| THEORY WITH LAB COMPONENT |             |                                    |          |                  |   |    |                       |         |
| 4                         | U23EN202    | Proficiency in English             | HSMC     | 2                | 0 | 2  | 4                     | 3       |
| 5                         | U23CS202    | Digital Logic Circuits             | ESC      | 2                | 0 | 2  | 4                     | 3       |
| 6                         | U23MA202    | Advanced calculus and Statistics   | BSC      | 3                | 0 | 2  | 5                     | 4       |
| PRACTICAL                 |             |                                    |          |                  |   |    |                       |         |
| 7                         | U23CS211    | Python Programming Laboratory      | ESC      | 0                | 0 | 2  | 2                     | 1       |
| 8                         | U23GE212    | Engineering Practices Laboratory   | ESC      | 0                | 0 | 2  | 2                     | 1       |
| 9                         | U23GE213    | Engineering Graphics Laboratory    | ESC      | 0                | 0 | 2  | 2                     | 1       |
| 10                        | U23EE202    | Career Enhancement Training-II     | EEC      | 0                | 0 | 2  | 2                     | 1       |
| 11                        | U23VExxx    | Vocational Enhancement Training-II | VEC      | 0                | 0 | 2  | 2                     | 1*      |
| Total                     |             |                                    |          | 14               | 0 | 16 | 30                    | 21      |

| SEMESTER-III              |             |                                             |          |                  |   |    |                       |         |
|---------------------------|-------------|---------------------------------------------|----------|------------------|---|----|-----------------------|---------|
| S. No.                    | COURSE CODE | COURSE TITLE                                | CATEGORY | PERIODS PER WEEK |   |    | TOTAL CONTACT PERIODS | CREDITS |
|                           |             |                                             |          | L                | T | P  |                       |         |
| THEORY                    |             |                                             |          |                  |   |    |                       |         |
| 1                         | U23MA306    | Probability and Linear Algebra              | BSC      | 3                | 1 | 0  | 4                     | 4       |
| 2                         | U23CS301    | Data Structures and Algorithms              | PCC      | 3                | 1 | 0  | 4                     | 4       |
| 3                         | U23CS302    | Object Oriented Programming using JAVA      | PCC      | 3                | 0 | 0  | 3                     | 3       |
| 4                         | U23CS303    | Computer Organization and Architecture      | ESC      | 3                | 0 | 0  | 3                     | 3       |
| THEORY WITH LAB COMPONENT |             |                                             |          |                  |   |    |                       |         |
| 5                         | U23CS304    | Foundations of Data Science                 | PCC      | 3                | 0 | 2  | 5                     | 4       |
| PRACTICAL                 |             |                                             |          |                  |   |    |                       |         |
| 6                         | U23CS311    | Data Structures Laboratory                  | PCC      | 0                | 0 | 2  | 2                     | 1       |
| 7                         | U23CS312    | JAVA Programming Laboratory                 | PCC      | 0                | 0 | 2  | 2                     | 1       |
| 8                         | U23EE313    | Aptitude and communication for Engineers –I | EEC      | 0                | 0 | 2  | 2                     | 1       |
| 9                         | U23VExxx    | Vocational Enhancement Training-III         | VEC      | 0                | 0 | 2  | 2                     | 1*      |
| MANDATORY COURSE          |             |                                             |          |                  |   |    |                       |         |
| 10                        | U23MCxxx    | Mandatory Course -1                         | MC       | 2                | 0 | 0  | 2                     | 0       |
| Total                     |             |                                             |          | 17               | 2 | 10 | 29                    | 21      |

| SEMESTER-IV               |             |                                              |          |                  |   |    |                       |         |
|---------------------------|-------------|----------------------------------------------|----------|------------------|---|----|-----------------------|---------|
| S. No.                    | COURSE CODE | COURSE TITLE                                 | CATEGORY | PERIODS PER WEEK |   |    | TOTAL CONTACT PERIODS | CREDITS |
|                           |             |                                              |          | L                | T | P  |                       |         |
| THEORY                    |             |                                              |          |                  |   |    |                       |         |
| 1                         | U23MA408    | Discrete Mathematics                         | BSC      | 3                | 0 | 0  | 3                     | 3       |
| 2                         | U23CS401    | Database Management systems                  | PCC      | 3                | 0 | 0  | 3                     | 3       |
| 3                         | U23CS402    | Introduction to Operating Systems            | PCC      | 3                | 0 | 0  | 3                     | 3       |
| 4                         | U23CS403    | Internet of Things                           | PCC      | 3                | 0 | 0  | 3                     | 3       |
| 5                         | U23CS404    | Theory of Computation                        | PCC      | 3                | 1 | 0  | 4                     | 4       |
| THEORY WITH LAB COMPONENT |             |                                              |          |                  |   |    |                       |         |
| 6                         | U23CS405    | Object Oriented Software Engineering         | PCC      | 3                | 0 | 2  | 5                     | 4       |
| PRACTICAL                 |             |                                              |          |                  |   |    |                       |         |
| 7                         | U23CS411    | Database Management Systems Laboratory       | PCC      | 0                | 0 | 2  | 2                     | 1       |
| 8                         | U23CS412    | Introduction to Operating Systems Laboratory | PCC      | 0                | 0 | 2  | 2                     | 1       |
| 9                         | U23EE413    | Aptitude and communication for Engineers -II | EEC      | 0                | 0 | 2  | 2                     | 1       |
| 10                        | U23VExxx    | Vocational Enhancement Training-IV           | VEC      | 0                | 0 | 2  | 2                     | 1*      |
| MANDATORY COURSE          |             |                                              |          |                  |   |    |                       |         |
| 11                        | U23MCxxx    | Mandatory Course -2                          | MC       | 2                | 0 | 0  | 2                     | 0       |
| Total                     |             |                                              |          | 20               | 1 | 10 | 32                    | 23      |

| SEMESTER-V                |             |                                              |          |                  |   |   |                       |         |
|---------------------------|-------------|----------------------------------------------|----------|------------------|---|---|-----------------------|---------|
| S. No.                    | COURSE CODE | COURSE TITLE                                 | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|                           |             |                                              |          | L                | T | P |                       |         |
| THEORY                    |             |                                              |          |                  |   |   |                       |         |
| 1                         | U23CS501    | Artificial Intelligence and Machine Learning | PCC      | 3                | 1 | 0 | 4                     | 4       |
| 2                         | U23CS502    | Computer Networks                            | PCC      | 3                | 0 | 0 | 3                     | 3       |
| 3                         | U23CSPxx    | Professional Elective-I                      | PEC      | -                | - | - | -                     | 3       |
| 4                         | U23XXOxx    | Open Elective-I                              | OEC      | 3                | 0 | 0 | 3                     | 3       |
| 5                         | U23XXOxx    | Open Elective-II                             | OEC      | 3                | 0 | 0 | 3                     | 3       |
| THEORY WITH LAB COMPONENT |             |                                              |          |                  |   |   |                       |         |
| 6                         | U23CS503    | Web Design                                   | PCC      | 3                | 0 | 2 | 5                     | 4       |
| PRACTICAL                 |             |                                              |          |                  |   |   |                       |         |
| 7                         | U23CS511    | Computer Networks                            | PCC      | 0                | 0 | 2 | 2                     | 1       |
| 8                         | U23EE517    | Campus to Corporate -I                       | EEC      | 0                | 0 | 2 | 2                     | 1       |
| 9                         | U23CS512    | Internship- I**                              | EEC      | 0                | 0 | 0 | 0                     | 1       |
| 10                        | U23VExxx    | Vocational Enhancement Training-V            | VEC      | 0                | 0 | 2 | 2                     | 1*      |
| MANDATORY COURSE          |             |                                              |          |                  |   |   |                       |         |
| 11                        | U23MCxxx    | Mandatory Course -3                          | MC       | 2                | 0 | 0 | 2                     | 0       |
| Total                     |             |                                              |          | 20               | 1 | 8 | 29                    | 23      |

\*\* Summer Internship

| SEMESTER-VI               |             |                                    |          |                  |   |    |                       |         |
|---------------------------|-------------|------------------------------------|----------|------------------|---|----|-----------------------|---------|
| S. No.                    | COURSE CODE | COURSE TITLE                       | CATEGORY | PERIODS PER WEEK |   |    | TOTAL CONTACT PERIODS | CREDITS |
|                           |             |                                    |          | L                | T | P  |                       |         |
| THEORY                    |             |                                    |          |                  |   |    |                       |         |
| 1                         | U23CS601    | Compiler Design                    | PCC      | 3                | 0 | 0  | 3                     | 3       |
| 2                         | U23CSPxx    | Professional Elective-II           | PEC      | -                | - | -  | -                     | 3       |
| 3                         | U23CSPxx    | Professional Elective-III          | PEC      | -                | - | -  | -                     | 3       |
| 4                         | U23XXOxx    | Open Elective-III                  | OEC      | 3                | 0 | 0  | 3                     | 3       |
| 5                         | U23XXOxx    | Open Elective-IV                   | OEC      | 3                | 0 | 0  | 3                     | 3       |
| THEORY WITH LAB COMPONENT |             |                                    |          |                  |   |    |                       |         |
| 6                         | U23CS603    | Cryptography and Cyber Security    | PCC      | 3                | 0 | 2  | 5                     | 4       |
| PRACTICAL                 |             |                                    |          |                  |   |    |                       |         |
| 7                         | U23CS611    | Compiler Design Laboratory         | PCC      | 0                | 0 | 4  | 4                     | 2       |
| 8                         | U23EE618    | Campus to Corporate -II            | EEC      | 0                | 0 | 2  | 2                     | 1       |
| 9                         | U23VExxx    | Vocational Enhancement Training-VI | VEC      | 0                | 0 | 2  | 2                     | 1*      |
| MANDATORY COURSE          |             |                                    |          |                  |   |    |                       |         |
| 10                        | U23MCxxx    | Mandatory Course -4                | MC       | 2                | 0 | 0  | 2                     | 0       |
| Total                     |             |                                    |          | 20               | 0 | 10 | 30                    | 22      |

| SEMESTER-VII              |             |                                |          |                  |   |   |                       |         |
|---------------------------|-------------|--------------------------------|----------|------------------|---|---|-----------------------|---------|
| S. No.                    | COURSE CODE | COURSE TITLE                   | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|                           |             |                                |          | L                | T | P |                       |         |
| THEORY                    |             |                                |          |                  |   |   |                       |         |
| 1                         | U23CS701    | Software Project Management    | PCC      | 3                | 0 | 0 | 3                     | 3       |
| 2                         | U23CSPxx    | Professional Elective-IV       | PEC      | -                | - | - | -                     | 3       |
| 3                         | U23CSPxx    | Professional Elective-V        | PEC      | -                | - | - | -                     | 3       |
| 4                         | U23CSPxx    | Professional Elective-VI       | PEC      | -                | - | - | -                     | 3       |
| 5                         | U23GExxx    | Management Elective            | HSMC     | 3                | 0 | 0 | 3                     | 3       |
| THEORY WITH LAB COMPONENT |             |                                |          |                  |   |   |                       |         |
| 6                         | U23CS702    | Cloud Computing Virtualization | PCC      | 3                | 0 | 2 | 5                     | 4       |
| PRACTICAL                 |             |                                |          |                  |   |   |                       |         |
| 7                         | U23CS711    | Project Phase-I / Internship   | EEC      | 0                | 0 | 4 | 4                     | 2       |
| Total                     |             |                                |          | 18               | 0 | 6 | 24                    | 21      |

| SEMESTER-VIII |             |                             |          |                  |   |    |                       |         |
|---------------|-------------|-----------------------------|----------|------------------|---|----|-----------------------|---------|
| S.No.         | COURSE CODE | COURSE TITLE                | CATEGORY | PERIODS PER WEEK |   |    | TOTAL CONTACT PERIODS | CREDITS |
|               |             |                             |          | L                | T | P  |                       |         |
| PRACTICAL     |             |                             |          |                  |   |    |                       |         |
| 1             | U23CS811    | Project Phase-II/Internship | EEC      | 0                | 0 | 20 | 20                    | 10      |
| Total         |             |                             |          | 0                | 0 | 20 | 20                    | 10      |

\*Indicated courses have not been included for Total credits and CGPA calculation of individual semesters, it can be provided additionally as special credits.

#### Scheme of Credit Distribution- Summary

| S. No.       | Category                                | Semester  |           |           |           |           |           |           |           | Total Credits |
|--------------|-----------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|
|              |                                         | I         | II        | III       | IV        | V         | VI        | VII       | VIII      |               |
| 1.           | Humanities and Management Courses(HSMC) | 5         | 4         |           |           |           |           | 3         |           | 12            |
| 2.           | Basic Science Course (BSC)              | 12        | 7         | 4         | 3         |           |           |           |           | 26            |
| 3.           | Engineering Science Course(ESC)         | 5         | 9         | 3         |           |           |           |           |           | 17            |
| 4.           | Professional Core Course(PCC)           |           |           | 13        | 19        | 12        | 9         | 7         |           | 60            |
| 5.           | Professional Elective Course(PEC)       |           |           |           |           | 3         | 6         | 9         |           | 18            |
| 6.           | Open Elective Course(OEC)               |           |           |           |           | 6         | 6         |           |           | 12            |
| 7.           | Employability Enhancement Skills        | 1         | 1         | 1         | 1         | 2         | 1         | 2         | 10        | 19            |
| 8.           | Mandatory Course(MC)                    | --        | --        | ✓         | ✓         | ✓         | ✓         | --        | --        | --            |
| <b>Total</b> |                                         | <b>23</b> | <b>21</b> | <b>21</b> | <b>23</b> | <b>23</b> | <b>22</b> | <b>21</b> | <b>10</b> | <b>164</b>    |

**PROFESSIONAL ELECTIVE COURSES: VERTICALS****VERTICAL 1: DATA SCIENCE**

| S. NO. | COURSE CODE | COURSE TITLE                            | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|-----------------------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                                         |          | L                | T | P |                      |         |
| 1      | U23CSP11    | Video Creation and Editing              | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP12    | Multimedia and Animation                | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP13    | UI and UX Design                        | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 4      | U23CSP14    | Digital marketing                       | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP15    | Visual Effects                          | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP16    | Multimedia Data Compression and Storage | PEC      | 2                | 0 | 2 | 4                    | 3       |

**VERTICAL 2: FULL STACK DEVELOPMENT**

| S. NO. | COURSE CODE | COURSE TITLE                        | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|-------------------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                                     |          | L                | T | P |                      |         |
| 1      | U23CSP21    | Web Technologies                    | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP22    | App Development                     | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP23    | Principles of Programming Languages | PEC      | 3                | 0 | 0 | 3                    | 3       |
| 4      | U23CSP24    | Software Testing and Automation     | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP25    | Web Application Security            | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP26    | DevOps                              | PEC      | 2                | 0 | 2 | 4                    | 3       |

**VERTICAL 3: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES**

| S. NO. | COURSE CODE | COURSE TITLE                  | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|-------------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                               |          | L                | T | P |                      |         |
| 1      | U23CSP31    | Cloud Services Management     | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP32    | Data Warehousing              | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP33    | Storage Technologies          | PEC      | 3                | 0 | 0 | 3                    | 3       |
| 4      | U23CSP34    | Software Defined Networks     | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP35    | Stream Processing             | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP36    | Security and Privacy in Cloud | PEC      | 2                | 0 | 2 | 4                    | 3       |

**VERTICAL 4: CYBER SECURITY AND DATA PRIVACY**

| S. NO. | COURSE CODE | COURSE TITLE                               | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|--------------------------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                                            |          | L                | T | P |                      |         |
| 1      | U23CSP41    | Ethical Hacking                            | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP42    | Digital and Mobile Forensics               | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP43    | Social Network Security                    | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 4      | U23CSP44    | Engineering Secure Software Systems        | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP45    | Cryptocurrency and Blockchain Technologies | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP46    | Network Security                           | PEC      | 2                | 0 | 2 | 4                    | 3       |

### VERTICAL 5: CREATIVE MEDIA

| S. NO. | COURSE CODE | COURSE TITLE              | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|---------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                           |          | L                | T | P |                      |         |
| 1      | U23CSP51    | Exploratory Data Analysis | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP52    | Recommender Systems       | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP53    | Business Analytics        | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 4      | U23CSP54    | Image and Video Analytics | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP55    | Computer Vision           | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP56    | Big Data Analytics        | PEC      | 2                | 0 | 2 | 4                    | 3       |

### VERTICAL 6: EMERGING TECHNOLOGIES

| S. NO. | COURSE CODE | COURSE TITLE                      | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|-----------------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                                   |          | L                | T | P |                      |         |
| 1      | U23CSP61    | Augmented Reality/Virtual Reality | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP62    | Robotic Process Automation        | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP63    | Neural Networks and Deep Learning | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 4      | U23CSP64    | Cyber security                    | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP65    | Quantum Computing                 | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP66    | 3D Printing and Design            | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 7      | U23CSP67    | Prompt Engineering                | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 8      | U23CSP68    | Expandable AI                     | PEC      | 2                | 0 | 2 | 4                    | 3       |

### VERTICAL 7: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

| S. NO. | COURSE CODE | COURSE TITLE             | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIOD | CREDITS |
|--------|-------------|--------------------------|----------|------------------|---|---|----------------------|---------|
|        |             |                          |          | L                | T | P |                      |         |
| 1      | U23CSP71    | Knowledge Engineering    | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 2      | U23CSP72    | Soft Computing           | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 3      | U23CSP73    | Text and Speech Analysis | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 4      | U23CSP74    | Optimization Techniques  | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 5      | U23CSP75    | Game Theory              | PEC      | 2                | 0 | 2 | 4                    | 3       |
| 6      | U23CSP76    | Ethics and AI            | PEC      | 2                | 0 | 2 | 4                    | 3       |

### OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

| S.NO. | COURSE CODE                                       | COURSE TITLE                             | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|-------|---------------------------------------------------|------------------------------------------|------------------|---|---|-----------------------|---------|
|       |                                                   |                                          | L                | T | P |                       |         |
|       | OFFERED BY DEPARTMENT OF AERONAUTICAL ENGINEERING |                                          |                  |   |   |                       |         |
| 1.    | U23AEO11                                          | Introduction to Industrial Engineering   | -                | - | - | 3                     | 3       |
| 2.    | U23AEO12                                          | Drone Technologies                       | -                | - | - | 3                     | 3       |
| 3.    | U23AEO13                                          | Fundamentals of Aeronautical Engineering | -                | - | - | 3                     | 3       |
| 4.    | U23AEO14                                          | Aviation Management                      | -                | - | - | 3                     | 3       |
| 5.    | U23AEO15                                          | Reverse Engineering                      | -                | - | - | 3                     | 3       |
| 6.    | U23AEO16                                          | Additive Manufacturing                   | -                | - | - | 3                     | 3       |
| 7.    | U23AEO17                                          | Renewable Energy Technologies            | -                | - | - | 3                     | 3       |
|       | OFFERED BY DEPARTMENT OF AGRICULTURAL ENGINEERING |                                          |                  |   |   |                       |         |
| 1.    | U23AGO11                                          | Sustainability and Green Building        | -                | - | - | 3                     | 3       |
| 2.    | U23AGO12                                          | Precision Farming                        | -                | - | - | 3                     | 3       |
| 3.    | U23AGO13                                          | Urban Agriculture                        | -                | - | - | 3                     | 3       |
| 4.    | U23AGO14                                          | Organic Farming                          | -                | - | - | 3                     | 3       |
| 5.    | U23AGO15                                          | Integrated Farming System                | -                | - | - | 3                     | 3       |
| 6.    | U23AGO16                                          | Renewable Energy System                  | -                | - | - | 3                     | 3       |
| 7.    | U23AGO17                                          | IT in Agricultural System                | -                | - | - | 3                     | 3       |

|    |                                                        |                                                     |   |   |   |   |   |
|----|--------------------------------------------------------|-----------------------------------------------------|---|---|---|---|---|
|    | <b>OFFERED BY DEPARTMENT OF CIVIL ENGINEERING</b>      |                                                     |   |   |   |   |   |
| 1. | U23CEO11                                               | Green Buildings                                     | - | - | - | 3 | 3 |
| 2. | U23CEO12                                               | Environmental and Social Impact Assessment          | - | - | - | 3 | 3 |
| 3. | U23CEO13                                               | Fire Safety Engineering                             | - | - | - | 3 | 3 |
| 4. | U23CEO14                                               | Geographical Information System                     | - | - | - | 3 | 3 |
| 5. | U23CEO15                                               | Basics of Integrated Water Resources Management     | - | - | - | 3 | 3 |
| 6. | U23CEO16                                               | Drinking Water Supply and Treatment                 | - | - | - | 3 | 3 |
|    | <b>OFFERED BY DEPARTMENT OF FOOD TECHNOLOGY</b>        |                                                     |   |   |   |   |   |
| 1. | U23FTO11                                               | Traditional Indian Foods                            | - | - | - | 3 | 3 |
| 2. | U23FTO12                                               | Food, Nutrition and Health                          | - | - | - | 3 | 3 |
| 3. | U23FTO13                                               | Introduction to Food processing                     | - | - | - | 3 | 3 |
| 4. | U23FTO14                                               | Fundamentals of Food Engineering                    | - | - | - | 3 | 3 |
| 5. | U23FTO15                                               | Food Safety and Quality Regulations                 | - | - | - | 3 | 3 |
| 6. | U23FTO16                                               | Nutraceuticals                                      | - | - | - | 3 | 3 |
|    | <b>OFFERED BY DEPARTMENT OF SCIENCE AND HUMANITIES</b> |                                                     |   |   |   |   |   |
| 1. | U23HSO11                                               | Project Report Writing                              | - | - | - | 3 | 3 |
| 2. | U23HSO12                                               | Engineering Ethics and Sustainable Development      | - | - | - | 3 | 3 |
| 3. | U23HSO13                                               | English for Competitive Examinations                | - | - | - | 3 | 3 |
| 4. | U23HSO14                                               | Democracy and Good Governance                       | - | - | - | 3 | 3 |
| 5  | U23HSO15                                               | Basic Language Skills                               | - | - | - | 3 | 3 |
|    | <b>OFFERED BY GENERAL ENGINEERING</b>                  |                                                     |   |   |   |   |   |
| 1. | U23GEO11                                               | New Product Development                             | - | - | - | 3 | 3 |
| 2. | U23GEO12                                               | Industrial Management                               | - | - | - | 3 | 3 |
| 3. | U23GEO13                                               | Quality Engineering                                 | - | - | - | 3 | 3 |
| 4. | U23GEO14                                               | Foundation Skills in Integrated Product Development | - | - | - | 3 | 3 |
| 5. | U23GEO15                                               | Production Planning and Control                     | - | - | - | 3 | 3 |
| 6. | U23GEO16                                               | Industrial safety                                   | - | - | - | 3 | 3 |

|     |          |                                  |   |   |   |   |   |
|-----|----------|----------------------------------|---|---|---|---|---|
| 7.  | U23GEO17 | Applied Design Thinking          | - | - | - | 3 | 3 |
| 8.  | U23GEO18 | NGOs and Sustainable Development | - | - | - | 3 | 3 |
| 9.  | U23GEO19 | IoT Concepts and Applications    | - | - | - | 3 | 3 |
| 10. | U23GEO20 | Vehicle Maintenance              | - | - | - | 3 | 3 |

#### MANDATORY COURSES

| S.NO | COURSE CODE | COURSE NAME                                 | PERIODS PER WEEK |   |   | TOTAL HOURS |
|------|-------------|---------------------------------------------|------------------|---|---|-------------|
|      |             |                                             | L                | T | P |             |
| 1.   | U23MC301    | Life skills and Ethics                      | 2                | 0 | 0 | 2           |
| 2.   | U23MC302    | Universal Human Values                      | 2                | 0 | 0 | 2           |
| 3.   | U23MC401    | Disaster Risk Reduction Management          | 2                | 0 | 0 | 2           |
| 4.   | U23MC402    | Environmental Eco system and Sustainability | 2                | 0 | 0 | 2           |
| 5.   | U23MC403    | Environmental Sciences and Climatic Changes | 2                | 0 | 0 | 2           |
| 6.   | U23MC504    | Entrepreneurship and Innovation             | 2                | 0 | 0 | 2           |
| 7.   | U23MC601    | Intellectual Property Rights                | 2                | 0 | 0 | 2           |
| 8.   | U23MC602    | Industrial Safety                           | 2                | 0 | 0 | 2           |
| 9.   | U23MC603    | Constitution of India                       | 2                | 0 | 0 | 2           |

#### MANAGEMENT ELECTIVE

| S.NO | COURSE CODE | COURSE NAME                                    | PERIODS PER WEEK |   |   | TOTAL HOURS |
|------|-------------|------------------------------------------------|------------------|---|---|-------------|
|      |             |                                                | L                | T | P |             |
| 1.   | U23GE701    | Total Quality Management                       | 3                | 0 | 0 | 3           |
| 2.   | U23GE702    | Principles of Management                       | 3                | 0 | 0 | 3           |
| 3.   | U23GE703    | Engineering Economics and Financial Accounting | 3                | 0 | 0 | 3           |
| 4.   | U23GE704    | Human Resource Management                      | 3                | 0 | 0 | 3           |
| 5.   | U23GE705    | Knowledge Management                           | 3                | 0 | 0 | 3           |
| 6.   | U23GE706    | Industrial Management                          | 3                | 0 | 0 | 3           |

#### VOCATIONAL ENHANCEMENT TRAINING

1. Innovative Problem Solving with emerging technologies
2. Professional Practices in Engineering – I
3. Professional Practices in Engineering – II
4. Professional Practices in Engineering – III

## **CAREER ENHANCEMENT TRAINING**

1. Career Enhancement Training-I
2. Career Enhancement Training-II
3. Aptitude and Communication for Engineers -I
4. Aptitude and Communication for Engineers -II
5. Campus to Corporate -I
6. Campus to Corporate -I

**Approved in the Second BOS meeting dated on 22.1.2024**

**BOS –Chairman**

**Principal**

## SEMESTER I

U23EN101

ENGLISH FOR ENGINEERS

Category : HSMC

SDG: 4

(Common to all Branches)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. To enable learners of engineering and technology to develop their basic communication skills in English.
2. To acquire, command in both the respective skills (listening and reading) and the productive skills (writing and speaking) of the English language.
3. To understand the key concepts of values, life skills and business communication and motivate students to look within and create a better version of themselves.
4. To focus on the development of basic fluency in English, usage of vocabulary in the technical field, and strengthening reading and official written communication skills.
5. To use language efficiently in expressing their opinions via various media.

**UNIT 1****INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION****9**

Listening– listening to Audio/video(formal & informal);Telephonic conversation (Activity)  
 Speaking-Self Introduction; Introducing a friend (Activity);Conversation-politeness strategies;  
 Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts-Writing-Writing on self, Writing Definition; Jumbled sentence  
 Grammar – Simple present tense, Present continuous, Present perfect, Present perfect continuous;  
 Question types: Wh/ Yes or No/ and Tags; Word formation, One-word substitution.

**UNIT 2****NARRATION AND SUMMATION****9**

Listening- Listening to the podcast, anecdotes/stories/event narration; documentaries and interviews with celebrities (Activity). Speaking-Narrating personal experiences/events; interviewing a celebrity (Activity). Reading- Reading biographies, travelogues, newspaper reports, Writing- Guided Writing-Paragraph writing, Short Report on an event (field trip etc.) - Grammar– Simple past tense, Past continuous, Past perfect, Past perfect continuous; Subject- Verb Agreement; Prepositions, Word forms (prefixes & suffixes); Error Correction.

**UNIT 3****DESCRIPTION OF PROCESS/PRODUCT****9**

Listening – Listening to specific audio tracks (Activity) Speaking – Picture description; giving instruction to use the product; presenting a product; Role play (Activity) -Reading – Reading advertisements, gadget reviews; finding key information from a given text- Writing - Instructions; Process description; Grammar - Simple future tense, Future continuous, Future perfect, Future perfect continuous; Imperatives; Adjectives; Degrees of comparison; Compound Words.

**UNIT 4 CLASSIFICATION AND RECOMMENDATIONS 9**

Listening – watching videos/ documentaries and responding to the questions based on them, Scientific lectures; and educational videos. Speaking – Small Talk; Mini presentations (Activity) - Reading – Journal reports, predicting content of reading habits, Reading articles (Activity)- Writing –Memos to colleagues or friends; Opinion Blogs; Grammar – Articles; Pronouns - Possessive & Relative pronouns, Cause and Effect.

**UNIT 5 EXPRESSION 9**

Listening – Listening to different accent, Listening to speeches or presentation- Speaking – Debates and Expressing opinions through Simulations, exchanging personal information - (Activity)- Reading – Reading editorials; Poster making (Activity)- Writing – Creative Writing, Checklist- Grammar – Punctuation; Compound Nouns, Homonyms; and Homophones, Simple, Compound & Complex Sentences.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Listen and comprehend complex academic texts.

**CO2:** Understand the denotative and connotative meanings of technical texts.

**CO3:** Identify definitions, descriptions, narrations and essays on various topics.

**CO4:** Apply different methods of integration in solving practical problems.

**CO5:** Express their opinions effectively in both oral and written medium of communication.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University (2020 edition).
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr.VeenaSelvam, Dr.Sujatha Priyadarshini, Dr.Deepa Mary Francis, Dr.KN.Shoba and Dr.Lourdes Jovani, Department of English, Anna University.

**REFERENCES:**

1. Technical Communication – Principles and Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English by Lakshmi Narayanan, Scitech Publications (India) Pvt.Ltd.
- 3.English for Technical Communication (with CD) by Aysha Viswamohan, Mc-graw Hill Education, ISBN:0070264244
4. Effective Communication Skill, KulbhusanKumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate–Dr.V.Chellammal, Allied Publishing House, NewDelhi, 2003.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                            |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO                                                                                                                                              | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                                                             | -   | -   | -   | -   | -   | 1   | 1   | -   | 3   | 1    | -    | 2    | -    | -    | -    |
| CO2                                                                                                                                             | -   | -   | -   | -   | -   | 1   | 1   | -   | 3   | -    | -    | 2    | -    | -    | -    |
| CO3                                                                                                                                             | -   | -   | -   | -   | -   | 1   | 1   | -   | 3   | 2    | -    | 3    | -    | -    | -    |
| CO4                                                                                                                                             | -   | -   | -   | -   | -   | 1   | 2   | -   | 3   | 1    | -    | 2    | -    | -    | -    |
| CO5                                                                                                                                             | -   | -   | -   | -   | -   | 1   | 2   | -   | 3   | 2    | -    | 3    | -    | -    | -    |
| Correlation levels:              1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY                                                | APPROVED BY                            |
|-------------------------------------------------------------------|----------------------------------------|
| Dr.T.Saranaya- AP/ English &<br>Prof. J.Brindha Devi- AP/ English | Dr.M.Kumaresan – Professor & Head/ S&H |
| Name and Department                                               | Name and Department of BoS Chairman    |

**U23MA101      CALCULUS AND DIFFERENTIAL EQUATIONS**  
**SDG: 4                      (Common to all Branches)**

**Category : BSC**  
**L      T      P      C**  
**3      1      0      4**

**COURSE OBJECTIVE:**

1. To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
2. To familiarize the students with differential calculus.
3. To enlighten the students with functions of several variables. This is needed in many branches of engineering.
4. To make the students acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
5. To acquaint the students with mathematical tools needed in evaluating multiple integrals and their applications.

**UNIT 1**

**MATRICES**

**9+3**

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley – Hamilton theorem (Statement and applications)

only) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Nature of Quadratic forms - Reduction of quadratic form to canonical form by orthogonal transformation.

**UNIT 2** **DIFFERENTIAL CALCULUS** **9 + 3**

Representation of functions - Limit of a function - Continuity - Derivatives -Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

**UNIT 3** **MULTIVARIABLE CALCULUS** **9 + 3**

Functions of two variables – Partial derivatives – Total differential – Taylor's series for functions of two variables – Jacobian's – Constrained maxima and minima – Lagrange's multiplier and its applications

**UNIT 4** **ORDINARY DIFFERENTIAL EQUATIONS OF SECOND ORDER** **9 + 3**

Linear differential equations of second order with constant coefficients. Linear differential Equations of second order with variable coefficients: Cauchy's linear differential equation - Method of variation of parameters for second order differential equations

**UNIT 5** **MULTIPLE INTEGRALS** **9 + 3**

Double integration with constant and variable limits - Region of integration - Area as double integral in Cartesian coordinates. Triple integral in Cartesian coordinates. Application of integration – Volume of Solids

**COURSE OUTCOMES:**

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

**CO1:** Comprehend the concepts of Eigen values, Eigen vectors, limits, continuity, functions of several variables, double integration and region of integration for solving complex problems.

**CO2:** Use rules of differentiation to solve maxima and minima problems.

**CO3:** Apply various techniques in solving ordinary and partial differential equations for practical applications.

**CO4:** Apply differential and integral calculus tools in modeling problems.

**CO5:** Evaluate integrals to compute area, volume and other practical problems.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition 2018.
2. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015.
3. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New delhi, 2016.

**REFERENCES:**

1. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009
2. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New delhi, 2016
3. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S.Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                 | 3   | 3   | 3   | 1   | 1   | 3   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO2                                                                                                                                 | 3   | 3   | 1   | -   | -   | 3   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO3                                                                                                                                 | 3   | 3   | 2   | -   | 1   | 3   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO4                                                                                                                                 | 3   | 3   | 3   | -   | -   | 3   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO5                                                                                                                                 | 3   | 3   | 2   | 1   | -   | 3   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| Correlation levels:            1 – low                      2 – medium                      3 – high            “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY              | APPROVED BY                            |
|---------------------------------|----------------------------------------|
| Dr. N. Vithya- ASP/ Mathematics | Dr.M.Kumaresan – Professor & Head/ S&H |
| Name and Department             | Name and Department of BoS Chairman    |

**U23PH101**  
**SDG: 4**

**ENGINEERING PHYSICS**  
**(Common to CSE & IT)**

**Category : BSC**  
**L T P C**  
**3 0 0 3**

**COURSE OBJECTIVE:**

1. Understand the basics of Properties of Matter and apply them to Engineering.
2. Explore the applications of Lasers and Fiber optics in engineering contexts.
3. Apply principles of Ultrasonics and Thermal Physics to Engineering challenges.
4. Grasp foundational Quantum Physics concepts and their modern applications.
5. Analyze Crystal systems and their structures in Engineering and Technology.

**UNIT 1 PROPERTIES OF MATTER 9**

Elasticity – Stress-strain diagram and its uses - Factors affecting elastic modulus – Torsional stress and deformations –Torsion pendulum: theory and experiment - Bending of beams - Bending moment – Cantilever: theory and experiment – Uniform and non-uniform bending: theory and experiment - I-shaped girders - Applications. – Basic Solved Problems.

**UNIT 2 LASER AND FIBER OPTICS 9**

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping- Einstein's A and B coefficients: derivation. Types of lasers – Nd-YAG, CO<sub>2</sub>- Industrial Applications of Lasers –Fiber Optics: Principle and propagation of light – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Temperature and displacement sensors.

**UNIT 3 ULTRASONICS AND THERMAL PHYSICS 9**

Introduction – Piezoelectric effect - piezoelectric generator - Velocity measurement – Acoustic grating – Ultrasonic Medical applications - Introduction to heat - Transfer of heat energy :Thermal conduction, convection and radiation –Thermal conductivity - Forbe's and Lee's disc method: theory and experiment – Applications: heat exchangers, refrigerators, ovens and solar water heaters.

**UNIT 4 QUANTUM PHYSICS 9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh-Jeans' Law from Planck's theory – Compton effect :Theory and experimental verification – Matter waves – Schrödinger's wave equation: Time independent and time dependent equations – Physical significance of wave function – Particle in a one-dimensional box - Microscope: Scanning Tunnelling microscope.

**UNIT 5 CRYSTAL PHYSICS 9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures – Polymorphism and allotropy - Crystal defects – Point, line and surface defects- Burger vector.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Realize the fundamental engineering ideas of matter, optics, heat, sound, and quantum theory.

**CO2:** Demonstrate a solid understanding of fundamental matter properties, Laser and Fiber optics classification, Quantum concepts and apply them successfully to solve practical engineering problems.

**CO3:** Apply the elastic modulus theory, Fiber Optic Sensors, Ultrasonics and thermal applications to integrate knowledge and problem solve at an advanced level.

**CO4:** Categorize the Elastic moduli concepts, Fiber optic lasers and Crystal structures to implement in Engineer problems in Material Science and electronics.

**CO5:** Analyze the foundational Quantum and Crystal Physics concepts to implement solutions for modern engineering problems.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012

**REFERENCES:**

1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011.
4. Kittel, C., Introduction to solid state Physics, Wiley, 2005.
5. Mani P. Engineering Physics I. Dhanam Publications, 2011.
6. Senthilkumar G. Engineering Physics I. VRB Publishers, 2011.

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1                                  | 3   | 3   | 1   | -   | 1   | -   | 1   | -   | -   | 1    | -    | 1    | -    | -    | -    |
| CO2                                  | 3   | 3   | 1   | -   | 1   | -   | 1   | -   | 1   | -    | -    | 1    | -    | -    | -    |
| CO3                                  | 3   | 3   | 1   | -   | 1   | -   | 1   | -   | 1   | -    | -    | 1    | -    | -    | -    |
| CO4                                  | 3   | 2   | 1   | -   | 1   | -   | -   | -   | -   | 1    | -    | 1    | -    | -    | -    |

|                            |   |                |   |   |                   |   |   |                 |   |   |                            |   |   |   |   |
|----------------------------|---|----------------|---|---|-------------------|---|---|-----------------|---|---|----------------------------|---|---|---|---|
| CO5                        | 3 | 3              | 1 | - | -                 | - | 1 | -               | 1 | - | -                          | 1 | - | - | - |
| <b>Correlation levels:</b> |   | <b>1 – low</b> |   |   | <b>2 – medium</b> |   |   | <b>3 – high</b> |   |   | <b>“-“- no correlation</b> |   |   |   |   |

| COURSE DESIGNED BY                     | APPROVED BY                            |
|----------------------------------------|----------------------------------------|
| Dr. T.Jayaprakash- Professor / Physics | Dr.M.Kumaresan – Professor & Head/ S&H |
| Name and Department                    | Name and Department of BoS Chairman    |

U23CY101

ENGINEERING CHEMISTRY

Category : BSC

SDG: 9

(Common to all Branches)

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. Learn boiler feed water requirements, and water treatment techniques.
2. To acquire knowledge about the preparation, properties and applications of polymers.
3. Understand the basic concepts of electrochemistry and its applications.
4. Learn corrosion control and protective techniques.
5. Acquire the knowledge about the fuels and properties of energy storage devices.

**UNIT 1****WATER TECHNOLOGY****9**

Introduction - Sources of water - Impurities in water - Types of water –Hardness of water - Expression of hardness - Units of hardness - Estimation of hardness of water by EDTA method - Disadvantages of using hard water - Boiler troubles - Scale and sludge - Softening of water - External treatment method - Demineralization process - Internal treatment process – Carbonate, Phosphate and Calgon conditioning - Desalination by reverse osmosis method.

**UNIT 2****POLYMERS****9**

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types: Addition, condensation and copolymerization and mechanism of Addition polymerization (Free Radical); Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon (6,6 and 11) and Epoxy resin. Engineering application of plastics- PVC, PTFE and Bakelite. Types of compounding of plastics- Moulding, injection moulding.

**UNIT 3****ELECTRO CHEMISTRY****9**

Electrochemistry: Introduction - Cells - Representation of a galvanic cell - Reversible and irreversible cells - Electrode potential - Nernst equation - Reference electrode (Calomel electrode) - Standard hydrogen electrode - Glass electrode - Electrochemical series and its applications – Battery: Introduction, Types of batteries- alkaline battery- lead storage battery - H<sub>2</sub> -O<sub>2</sub> fuel cell-

applications. Construction of solar cells and E-Vehicle.

#### **UNIT 4 CORROSION AND ITS CONTROL 9**

Introduction - Chemical corrosion and Wet corrosion - Galvanic and differential aeration (Pitting, Crevice and Pipeline) - Factors influencing rate of corrosion - Corrosion- causes- factors- corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method- Cathodic protection method.

#### **UNIT 5 FUELS AND COMBUSTION 9**

Introduction - Classification of fuels - Requirements of a good fuel – Combustion: Principle of combustion - Calorific value - Gross and net calorific values - Explosive range - Spontaneous ignition temperature. Fuels: Solid fuels - Coal and its varieties - Proximate analysis - Significance - Metallurgical coke - Otto-Hoffman byproduct method - Liquid fuel: Manufacture of synthetic petrol - Bergius method - Knocking - Octane number - Cetane number - Gaseous fuel: Liquefied petroleum gas (LPG), Compressed natural gas (CNG).

#### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Recall the concept about water technology, engineering polymers, electrodes, corrosion and combustion of fuels.

**CO2:** Understand the boiler problems and categorize the polymers.

**CO3:** Classify plastics, batteries, corrosion, and the calorific value of fuels.

**CO4:** Apply enough knowledge of contemporary water softening, polymerization, fuel cell, electrochemical protection, and fuel manufacturing procedures.

**CO5:** Analyze the hardness of water using the EDTA technique and characterization of coal.

**TOTAL: 45 PERIODS**

#### **TEXT BOOKS:**

1. Jain P C and Monica Jain, “Engineering Chemistry”, 17th Edition, Dhanpat Rai Publishing Co., 2018.
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2017.

#### **REFERENCES:**

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Textbook of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, “Engineering Chemistry” McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, “Engineering Chemistry”, Scientific International Pvt, Ltd, New Delhi, 2017.
4. Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, Second Edition, 2019.
5. R.D. Madan, “Modern Inorganic Chemistry”, S. Chand, New Delhi, 2012
6. S.S. Dara, “A Textbook of Engineering Chemistry”, S. Chand Publishing, 12th Edition, 2018.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                   |     |     |     |     |     |     |     |     |     |       |       |       |      |      |      |
|--------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|------|------|------|
| CO                                                                                                     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                    | 3   | -   | -   | 2   | -   | -   | 2   | -   | -   | -     | -     | 1     | -    | -    | -    |
| CO2                                                                                                    | 3   | -   | -   | 2   | 2   | -   | 2   | -   | -   | -     | -     | 2     | -    | -    | -    |
| CO3                                                                                                    | 3   | -   | -   | 2   | 2   | -   | 2   | -   | -   | -     | -     | 2     | -    | -    | -    |
| CO4                                                                                                    | 3   | -   | -   | 2   | 3   | -   | 2   | -   | -   | -     | -     | 3     | -    | -    | -    |
| CO5                                                                                                    | 3   | -   | -   | 2   | 3   | -   | 2   | -   | -   | -     | -     | 3     | -    | -    | -    |
|                                                                                                        |     |     |     |     |     |     |     |     |     |       |       |       |      |      |      |
| <b>Correlation levels:</b> <b>1 – low</b> <b>2 – medium</b> <b>3 – high</b> <b>“-“- no correlation</b> |     |     |     |     |     |     |     |     |     |       |       |       |      |      |      |

| <b>COURSE DESIGNED BY</b>              | <b>APPROVED BY</b>                         |
|----------------------------------------|--------------------------------------------|
| Dr.M.Kumaresan – Professor & Head/ S&H | Dr.M.Kumaresan – Professor & Head/ S&H     |
| <b>Name and Department</b>             | <b>Name and Department of BoS Chairman</b> |

**U23CS101**  
**SDG : 8**

**C-PROGRAMMING**  
**(Common to CSE & IT)**

**Category : ESC**  
**L T P C**  
**3 0 0 3**

**COURSE OBJECTIVE:**

1. To acquire knowledge about the concept of C programming, keywords and operators.
2. To classify the data types, structure of C program, looping statements, arrays and strings.
3. To identify the basics of functions, structures, nested structure and Union.
4. To the concept of searching, recursion and array of structure with dynamic memory allocation
5. To defund the pointers, file fundamentals of sequential, random access file and command line arguments.

**UNIT 1**

**BASICS OF C PROGRAMMING**

**9**

Introduction to Computer and programming paradigms – Applications of C Language - Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords –

Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements –Decision making statements - Switch statement - Looping statements – Preprocessor directives -Compilation process.

**UNIT 2** **ARRAYS AND STRINGS** **9**

Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

**UNIT 3** **FUNCTIONS AND POINTERS** **9**

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

**UNIT 4** **STRUCTURES AND UNION** **9**

Structure - Nested structures – Pointer and Structures – Array of structures – Self-referential structures – Dynamic memory allocation - Union - Storage classes and Visibility.

**UNIT 5** **FILE PROCESSING** **9**

Files – Types of file processing: Sequential access, Random access – Sequential access file - Random access file - Command line arguments.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Remember the concept of C programming to understand the functional knowledge about operators and the keywords used.

**CO2:** Demonstrate C program for data types, looping & array.

**CO3:** Illustrate the basics for functions, structures, pointers and union.

**CO4:** Make use of the concept to perform the operations dynamic memory allocation, searching and recursion.

**CO5:** Examine the file processing for sequential, random access and command line arguments.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, “C How to Program with an Introduction to C++”, Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, “Schaum’s Outline of Theory and Problems of Programming with C”, McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press, 2013.
5. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, 1st Edition, Pearson Education, 2013

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                    |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|------|
| CO                                                                                                                                      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1                                                                                                                                     | 1   | 2   | 2   | -   | 2   | -   | -   | -   | 2   | -     | -     | 2     | 1     | 2     | -    |
| CO2                                                                                                                                     | 2   | 2   | 2   | -   | 2   | -   | -   | -   | 2   | -     | -     | 3     | 2     | 2     | -    |
| CO3                                                                                                                                     | 3   | 3   | 2   | -   | 2   | -   | -   | -   | 2   | -     | -     | 2     | 2     | 2     | -    |
| CO4                                                                                                                                     | 2   | 2   | 2   | -   | 3   | -   | -   | -   | 2   | -     | -     | 3     | 2     | 2     | -    |
| CO5                                                                                                                                     | 2   | 3   | 3   | -   | 2   | -   | -   | -   | 2   | -     | -     | 2     | 2     | 3     | -    |
| Correlation levels:      1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |

| COURSE DESIGNED BY                                                           | APPROVED BY                              |
|------------------------------------------------------------------------------|------------------------------------------|
| Dr.S.Pathur Nisha, Professor & Head/ CSE &<br>Prof. Evance Leethail , AP/CSE | Dr.S.Pathur Nisha, Professor & Head/ CSE |
| Name and Department                                                          | Name and Department of BoS Chairman      |

U23HS101

**HERITAGE OF TAMIL**  
(Common to all Branches)

Category : HSMC  
L    T    P    C  
1    0    0    1

**COURSE OBJECTIVE:**

- 1.To learn the extensive literature of classical tamil
- 2.To review the fine arts heritage of tamil culture
- 3.To realize the contribution in Indian freedom struggle

**UNIT 1****LANGUAGE AND LITERATURE****3**

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.

**UNIT 2      HERITAGE - ROCK ART PAINTINGS TO MODERN ART –  
SCULPTURE** **3**

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.

**UNIT 3                      FOLK AND MARTIAL ARTS** **3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

**UNIT 4                      THINAI CONCEPT OF TAMILS** **3**

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.

**UNIT 5                      CONTRIBUTION OF TAMILS TO INDIAN NATIONAL  
MOVEMENT AND INDIAN CULTURE** **3**

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.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Remember the extensive literature of tamil and its classical nature, musical instruments, Folk, thinai concept, Indian Freedom Struggle& Aham, Puram and Aram Concept.

**CO2:** Remember the principles in Thirukural, Bakthi Literature Azhwars and Nayanmars , heritage of sculpture, painting and musical instruments of ancient people, victory of chozha dynasty.

**CO3:** Understand on folk and martial arts of tamil people, Justice in Sangam Literature, Development of Modern literature in Tamil, Making of musical instruments.

**CO4:** Understand the role of Temples in Social and Economic Life of Tamils, Ancient Cities and Ports of Sangam Age, Conquest of Cholas.

**CO5:** Understand the Cultural Influence of Tamils over the other parts of India, contribution of tamils self-esteem movement and siddha medicine, Print History of Tamil Books.

**TOTAL: 15 PERIODS**

**TEXT BOOKS:**

1.தமிழக வரலாறு – மக்களும் பண்பாடும் – .கக. கக பிள்ளை (வவையீடு):

தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள்கழகம்

2.கணினித்தமிழ் – முளனவர் இல. சுந்தரம் . (விகடன்பிரசுரம் ).

3.கீழடி – எவளக நதிக்களரயில் சங்ககால நகர நாகரிகம் (வதால்லியல் துளை (வவையீடு)

#### REFERENCES:

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. Subaramanian, Dr .K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
3. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies)
4. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                                    |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                                      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                                     | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -     | -     | -     |
| CO2                                                                                                                                                     | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -     | -     | -     |
| CO3                                                                                                                                                     | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -     | -     | -     |
| CO4                                                                                                                                                     | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -     | -     | -     |
| CO5                                                                                                                                                     | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -     | -     | -     |
| Correlation levels:                      1 – low                      2 – medium                      3 – high                      “-”- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY              | APPROVED BY                             |
|---------------------------------|-----------------------------------------|
| Prof. A.Prabhakaran – AP/ Tamil | Dr.M.Kumaresan - Professor & Head / S&H |
| Name and Department             | Name and Department of BoS Chairman     |

U23EE101

CAREER ENHANCEMENT TRAINING I

SDG: 17

(Common to all Branches)

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>1</b> |

**COURSE OBJECTIVE:**

1. To improve mathematical and analytical abilities of students, particularly in the context of comprehending engineering concepts and making data-driven decision.
2. To develop critical thinking skills including problem solving, logic, patterns, and reasoning.
3. To Comprehend and appreciate mathematical terminologies and concepts in order to understand, interpret, and represent science and technology.

|               |                     |          |
|---------------|---------------------|----------|
| <b>UNIT 1</b> | <b>FUNDAMENTALS</b> | <b>6</b> |
|---------------|---------------------|----------|

Divisibility Test - Square root and Cube roots – HCF &amp; LCM - problems on Numbers

|               |                |          |
|---------------|----------------|----------|
| <b>UNIT 2</b> | <b>ALGEBRA</b> | <b>5</b> |
|---------------|----------------|----------|

Simplification – Surds &amp; Indices – Linear &amp; Quadratic Equations

|               |                           |          |
|---------------|---------------------------|----------|
| <b>UNIT 3</b> | <b>BANKING ESSENTIALS</b> | <b>8</b> |
|---------------|---------------------------|----------|

Average – Percentage – Profit &amp; Loss – Simple Interest – Compound Interest

|               |                            |          |
|---------------|----------------------------|----------|
| <b>UNIT 4</b> | <b>TIME AND EFFICIENCY</b> | <b>8</b> |
|---------------|----------------------------|----------|

Time Speed Distance – Problems on Trains – Boats &amp; Streams – Time &amp; Work – Pipes &amp; Cisterns

|               |                          |          |
|---------------|--------------------------|----------|
| <b>UNIT 5</b> | <b>LOGICAL REASONING</b> | <b>3</b> |
|---------------|--------------------------|----------|

Number &amp; letter series – Analogy– Pattern classification – Coding &amp; Decoding

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Exhibit a clear understanding of fundamental concepts of aptitude for engineering.**CO2:** Demonstrate problem-solving skills and critical thinking abilities in the context of recruitment aptitude tests.**CO3:** To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes.**CO4:** Evaluate and interpret aptitude test results to identify areas of improvement and develop a personalized study plan for further enhancement.**TOTAL: 30 PERIODS****TEXT BOOKS:**

1. The Pearson Guide to Quantitative Aptitude For Competitive Examinations, Dinesh Khattar.  
Pearson

2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication.
3. A modern Approach to Verbal and Non-Verbal Reasoning R.s. Aggarwal.

**REFERENCES:**

1. Quantitative Aptitude for CAT, Arun Sharma.
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication.
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs, Sarvesh K. Verma.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House.
5. Wiley's Exam Expert Quantitative Ability for CAT, 2ed, Ashu Jain.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                                    |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|------|
| CO                                                                                                                                                      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1                                                                                                                                                     | 3   | 3   | 3   | 3   | -   | -   | -   | -   | -   | -     | -     | -     |       |       |      |
| CO2                                                                                                                                                     | 3   | 2   | 1   | 3   | -   | -   | -   | -   | -   | -     | -     | -     |       |       |      |
| CO3                                                                                                                                                     | 3   | 1   | 1   | 2   | -   | -   | -   | -   | -   | -     | -     | -     |       |       |      |
| CO4                                                                                                                                                     | 1   | 1   | 1   | 1   | -   | -   | -   | -   | -   | -     | -     | -     |       |       |      |
| CO5                                                                                                                                                     | -   | -   | -   | -   | -   | -   | -   | -   | -   | -     | -     | -     |       |       |      |
| Correlation levels:                      1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |

| COURSE DESIGNED BY              | APPROVED BY                            |
|---------------------------------|----------------------------------------|
| Prof. Ramesh Raja – Head/ NCPIR | Dr.M.Kumaresan – Professor & Head/ S&H |
| Name and Department             | Name and Department of BoS Chairman    |

U23CS111

C -PROGRAMMING LABORATORY

Category : ESC

SDG: 4

(Common to CSE &amp; IT)

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 4 | 2 |

**COURSE OBJECTIVE:**

1. To familiarize with C programming constructs.
2. To develop programs in C using basic constructs.
3. To develop programs in C using arrays.
4. To develop applications in C using strings, pointers, functions.
5. To develop applications in C using structures.
6. To develop applications in C using file processing.

**LIST OF EXPERIMENTS**

1. Writing algorithms, flow charts and pseudo codes for simple problems.
2. Programs on expressions and conversions.
3. Programs using if, if-else, switch and nested if statements.
4. Programs using while, do-while, for loops.
5. Programs on one dimensional array, passing arrays to functions and array operations.
6. Programs using two dimensional arrays, passing 2D arrays to functions.
7. Programs using String functions.
8. Programs using function calls, recursion, call by value.
9. Programs on pointer operators, call by reference, pointers with arrays
10. Programs using structures and unions.
11. Programs on file operations and modes.
12. Working with text files, random files and binary files.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Demonstrate knowledge on C programming constructs.

**CO2:** Develop programs in C using arrays.

**CO3:** Develop applications in C using strings, pointers, functions.

**CO4:** Develop applications in C using structures.

**CO5:** Develop applications in C using file processing.

**TOTAL: 60 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                  | 3   | 2   | 3   | 1   | 1   | 1   | -   | -   | 2   | -     | 2     | 2     | 2     | 2     | -     |

|                                                                                                                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2                                                                                                                                | 3 | 2 | 2 | 2 | 1 | 1 | - | - | 2 | - | 2 | 2 | 3 | 3 | - |
| CO3                                                                                                                                | 3 | 2 | 3 | 2 | 1 | 2 | - | - | 2 | - | 2 | 2 | 2 | 2 | - |
| CO4                                                                                                                                | 3 | 2 | 2 | 2 | 1 | 2 | - | - | 3 | - | 2 | 3 | 3 | 3 | - |
| CO5                                                                                                                                | 3 | 2 | 3 | 1 | 1 | 2 | - | - | 3 | - | 2 | 3 | 2 | 3 | - |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY                                                        | APPROVED BY                              |
|---------------------------------------------------------------------------|------------------------------------------|
| Dr.S.Pathur Nisha, Professor & Head/ CSE & Prof. Evance Leethail , AP/CSE | Dr.S.Pathur Nisha, Professor & Head/ CSE |
| Name and Department                                                       | Name and Department of BoS Chairman      |

U23BS111

SDG:4

**BASIC SCIENCE LABORATORY**

Category : BSC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 2 | 2 |

**COURSE OBJECTIVE:**

1. Realize the fundamental engineering ideas of matter, optics, heat, sound, and quantum theory.
2. Demonstrate a solid understanding of fundamental matter properties, Laser and Fiber optics classification, Quantum concepts and apply them successfully to solve practical engineering problems.
3. Apply the elastic modulus theory, Fiber Optic Sensors, Ultrasonics and thermal applications to integrate knowledge and problem solve at an advanced level.
4. Categorize the Elastic moduli concepts, Fiber optic lasers and Crystal structures to implement in Engineer problems in Material Science and electronics.
5. Analyse the foundational Quantum and Crystal Physics concepts to implement solutions for modern engineering problems.

**PHYSICS - LIST OF EXPERIMENTS (Any 5 Experiments)**

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus - Non uniform bending method.
3. Determination of Young's modulus - Uniform bending method.
4. Determination of thickness of a thin wire – Air wedge method.
5. Determination of the wavelength of the laser using grating .
6. Determination of Numerical Aperture and acceptance angle using Optical fibre.
7. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.

8. Determination of thermal conductivity of a bad conductor – Lee’s Disc method.
9. Melde’s string experiment.
10. Determination of Band gap of a semiconductor.

#### CHEMISTRY- LIST OF EXPERIMENTS (Any 5 Experiments)

1. Estimation of total, temporary and permanent hardness of water by EDTA method.
2. Estimation of alkalinity of the given water sample.
3. Determination of chloride content of water sample by Argentometric method.
4. Determination of strength of given hydrochloride acid using pH meter
5. Determination of DO content of water sample by Winkler’s method.
6. Conduct metric titration strong acid Vs Strong Base.
7. Estimation of BOD of the given water sample.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of Iron content by spectrophotometer.
10. Estimation of sodium present in water using flame photometer.

#### COURSE OUTCOMES:

At the end of the course, students would

**CO1:** Apply Physics principles of elasticity to evaluate engineering properties of materials.

**CO2:** Analyze the physical principle involved in various instruments in acoustics, optics and thermal physics.

**CO3:** Characterize the quality of water samples with respect to their acidity, alkalinity and hardness.

**CO4:** Apply chemistry principles to evaluate DO, BOD, Iron content of the given samples.

**CO5:** Analyze the strength and amount of acids using pH, potentiometer, conductivity meter and the amount of chloride, sodium iron using Argentometric method and flame photometer for the given solution.

**TOTAL: 60 PERIODS**

| <i>CO's-PO's &amp; PSO's MAPPING</i>                                                                                                                    |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO                                                                                                                                                      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                                                                     | 3   | 2   | 1   | 1   | -   | -   | 1   | -   | 1   | -    | -    | -    |      |      |      |
| CO2                                                                                                                                                     | 3   | 2   | 1   | 1   | -   | -   | 1   | -   | 1   | -    | -    | 1    |      |      |      |
| CO3                                                                                                                                                     | 3   | 2   | 1   | 1   | -   | -   | 1   | -   | 1   | -    | -    | -    |      |      |      |
| CO4                                                                                                                                                     | 3   | 2   | 1   | 1   | -   | -   | 1   | -   | 1   | -    | -    | 1    |      |      |      |
| CO5                                                                                                                                                     | 3   | 2   | -   | 1   | -   | -   | 1   | -   | 1   | -    | -    | 1    |      |      |      |
| Correlation levels:                      1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY                                                                 | APPROVED BY                                |
|------------------------------------------------------------------------------------|--------------------------------------------|
| Dr.M.Kumaresan – Professor & Head/ S&H &<br>Dr.T.Jayaprakash - Professor / Physics | Dr.M.Kumaresan – Professor & Head /<br>S&H |
| Name and Department                                                                | Name and Department of BoS Chairman        |

U23EN111

COMMUNICATIVE ENGLISH LABORATORY

Category : HSMC

SDG : 4

(Common to all Branches)

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**COURSE OBJECTIVE:**

1. To enable learners of engineering and technology to develop their basic communication skills in English.
2. To acquire, command in both the respective skills (listening and reading) and the productive skills (writing and speaking) of the English language.
3. To understand the key concepts of values, life skills and business communication and motivate students to look within and create a better version of themselves.
4. To focus on the development of basic fluency in English, usage of vocabulary in the technical field, and strengthening reading and official written communication skills.
5. To use language efficiently in expressing their opinions via various media.

**LIST OF EXPERIMENTS**

1. Conversation: Introduction to Classmates-Audio/Video (formal & informal)
2. Self-Introduction
3. Telephone Conversation
4. Listening to voicemail & messages
5. Listening and filling a form
6. Debate
7. Group Discussion
8. Exchanging personal Information
9. Introducing a friend politeness strategy
10. Essay Writing

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1** : To improve the communicative competence of learners

**CO2** :To help learners use language effectively in academic /work contexts

**CO3** : To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.

**CO4** : To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.

**CO5** : To use language efficiently in expressing their opinions via various media.

**30 Periods**

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                 | 3   | 2   | 3   | 1   | 1   | 1   | -   | -   | 2   | -     | 2     | 2     | 2     | 2     | -     |
| CO2                                                                                                                                 | 3   | 2   | 2   | 2   | 1   | 1   | -   | -   | 2   | -     | 2     | 2     | 3     | 3     | -     |
| CO3                                                                                                                                 | 3   | 2   | 3   | 2   | 1   | 2   | -   | -   | 2   | -     | 2     | 2     | 2     | 2     | -     |
| CO4                                                                                                                                 | 3   | 2   | 2   | 2   | 1   | 2   | -   | -   | 3   | -     | 2     | 3     | 3     | 3     | -     |
| CO5                                                                                                                                 | 3   | 2   | 3   | 1   | 1   | 2   | -   | -   | 3   | -     | 2     | 3     | 2     | 3     | -     |
| Correlation levels:            1 – low                      2 – medium                      3 – high            “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY                                                | APPROVED BY                               |
|-------------------------------------------------------------------|-------------------------------------------|
| Dr.T.Saranaya- AP/ English &<br>Prof. J.Brindha Devi- AP/ English | Dr.M.Kumaresan – Professor & Head/<br>S&H |
| Name and Department                                               | Name and Department of BoS<br>Chairman    |

## SEMESTER II

U23EN202

SDG: 4

### PROFICIENCY IN ENGLISH

Category : HSMC

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 2 | 3 |

#### **COURSE OBJECTIVE:**

1. To improve the communicative competence of learners.
2. To help learners use language effectively in academic /work contexts.
3. To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos, etc.
4. To build on students' English language skills by engaging them in listening, speaking, and grammar learning activities that are relevant to authentic contexts.
5. To use language efficiently in expressing their opinions via various media.

#### **UNIT 1 INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 6**

Listening -conversation: Introduction to classmates - Audio / video (formal & informal), Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies.

#### **UNIT 2 NARRATION AND SUMMATION 6**

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences describing experiences and feelings-engaging in small talk-describing requirements and abilities.

#### **UNIT 3 DESCRIPTION OF A PROCESS / PRODUCT 6**

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product.

#### **UNIT 4 CLASSIFICATION AND RECOMMENDATIONS 6**

Listening –Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress talking about travel preparations.

#### **UNIT 5 EXPRESSION 6**

Listening – Listening to debates/ discussions; panel discussions. Speaking –making predictions- talking about a given topic-giving opinions.

#### **LIST OF EXPERIMENTS**

1. Conversation: Introduction to Classmates-Audio/video (formal & informal).
2. Self-Introduction.
3. Telephone Conversation.
4. Listening to voicemail & messages.
5. Listening and filling a form.
6. Debate.
7. Group Discussion.

8. Exchanging personal Information.
9. Introducing a friend politeness strategy.
10. Essay Writing.

### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** To listen and comprehend general as well as complex academic information

**CO2:** To listen to and understand different points of view in a discussion.

**CO3:** To speak fluently and accurately in formal and informal communicative contexts.

**CO4:** To describe products and processes and explain their uses and purposes clearly and accurately.

**CO5:** To express their opinions effectively in both formal and informal discussions.

**TOTAL: 60 PERIODS**

### **TEXT BOOKS:**

1. English for Engineers & Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Jovani, Department of English, Anna University.
3. A Handbook for English Language Laboratories, E. Suresh Kumar, Department of English, College of Engineering, Osmania University, P. Sreehari, Department of English, College of Engineering, Osmania University. 2011.

### **REFERENCES:**

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshmi Narayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.
6. A Manual For English Language Laboratory, D. Sudha Rani, Pearson Education India, 2009.

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                  | -   | -   | -   | -   | -   | -   | 1   | 2   | 2   | 2     | -     | 3     | -     | -     | -     |

|                                                                                                                                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2                                                                                                                                           | - | - | - | - | - | - | - | 3 | 3 | 1 | - | 2 | - | - | - |
| CO3                                                                                                                                           | - | - | - | - | - | - | - | 2 | - | 2 | - | 3 | - | - | - |
| CO4                                                                                                                                           | - | - | - | - | - | - | 2 | 3 | 3 | 1 | - | 3 | - | - | - |
| CO5                                                                                                                                           | - | - | - | - | - | - | 1 | 3 | 2 | 1 | - | 3 | - | - | - |
| Correlation levels:            1 – low                      2 – medium                      3 – high                      “-“- no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY                                  | APPROVED BY                            |
|-----------------------------------------------------|----------------------------------------|
| Dr. Alice Evangelin Jebaselvi - Professor / English | Dr.M.Kumaresan – Professor & Head/ S&H |
| Name and Department                                 | Name and Department of BoS Chairman    |

U23MA202

ADVANCED CALCULUS AND STATISTICS

Category : BSC

SDG:4

(Embedded Theory and Lab)

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 2 | 4 |

**COURSE OBJECTIVE:**

1. Familiarize the student with vector calculus ideas in order to find line, surface and volume integrals in basic coordinate systems.
2. Understand and demonstrate basic conclusions by using Gauss, Stokes and Greens theorems.
3. Provide the required skill to apply the statistical tools in engineering problems.
4. Learn the theory of hypothesis testing for both small as well as large samples, which is an essential skill for solving real life problems
5. Introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of statistical quality control.

**UNIT 1****VECTOR DIFFERENTIAL CALCULUS**

Differentiation of Vectors– Scalar and Vector Point Functions–Gradient, divergence and curl– Directional derivative–Irrotational and Solenoidal vector fields– Application: Decision Review System in Cricket and Hit Distance Using Differentiation of Vectors.

9

**UNIT 2****VECTOR INTEGRAL CALCULUS**

Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (excluding proofs). Simple applications involving cubes and rectangular parallelepipeds.

9

**UNIT 3 CORRELATION AND LINEAR REGRESSION**

Correlation–Karl Pearson’s correlation coefficients–Spearman’s Rank Correlation–Regression–Estimation of Regression line–Application: Measuring the influences between factors- Estimation of association among the variables. **9**

**UNIT 4 HYPOTHESIS TESTING**

Small sample tests: Student t-test - Single mean and difference of two means – F Test for Variance - Chi square test for goodness of fit –Independence of attributes. **9**  
Application: Performance analysis- Comparative analysis–Quality testing.

**UNIT 5 DESIGN OF EXPERIMENTS**

Analysis of Variance: One way and two –way Classifications-Completely randomized design–Randomized block design– Latin square design. Application: Response Surface Methodology. **9**

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Determine the identities that link grad, div and curl in Cartesian and other basic coordinate systems

**CO2:** Apply the Gauss, Stokes and Greens theorems to stream line integral computations and demonstrate basic outcomes.

**CO3:** Compute correlation between variables and use regression to predict unknown values using R-studio.

**CO4** Apply the idea of hypothesis testing for both small and large samples in practical problems utilizing R- studio.

**CO5:** Construct the design of experiments modeling and analysis of variance using R- studio.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Erwin Kreyszig, " Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 41st Edition, 2011.
3. Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill, 3rd edition, 2008.

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1                                  | 3   | 3   | 3   | -   | 2   | -   | -   | -   | 1   | -     | -     | 1     | -     | -     | -    |

|                                                                                                                                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2                                                                                                                                   | 3 | 3 | 3 | - | 2 | - | - | - | 1 | - | - | 1 | - | - | - |
| CO3                                                                                                                                   | 3 | 3 | 3 | - | 2 | - | - | - | 1 | - | - | 2 | - | - | - |
| CO4                                                                                                                                   | 3 | 3 | 3 | - | 2 | - | - | - | 1 | - | - | 2 | - | - | - |
| CO5                                                                                                                                   | 3 | 3 | 3 | - | 2 | - | - | - | 1 | - | - | 2 | - | - | - |
| Correlation levels:    1 – low                      2 – medium                      3 – high                      “-“- no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY                               | APPROVED BY                            |
|--------------------------------------------------|----------------------------------------|
| Dr. N.Vithya – Associate Professor / Mathematics | Dr.M.Kumaresan – Professor & Head/ S&H |
| Name and Department                              | Name and Department of BoS Chairman    |

U23PH203

PHYSICS FOR INFORMATION SCIENCE

Category : BSC

SDG : 4

(Common to CSE &amp; IT)

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. Make the students understand the importance in studying electrical properties of materials.
2. Enable the students to gain knowledge in semiconductor physics.
3. Make the students to learn the origin of magnetism in magnetic materials and their classifications; to learn the physics of superconductivity and various properties exhibited by superconductors.
4. Make the students to learn the mechanisms of polarization in dielectric materials, and about classification and properties of dielectric materials; familiarize with the optical properties of materials.
5. Inculcate an idea of significance of Nano structures, quantum confinement, ensuing Nano materials preparation and applications.

**UNIT 1****ELECTRICAL PROPERTIES OF MATERIALS****9**

Introduction - Classical free electron theory - Expressions for Electrical and Thermal conductivity - Wiedemann-Franz law – Lorentz Number - Quantum free electron theory – Fermi distribution function – Effect of temperature on fermi function-Density of energy states – Carrier concentration in metals - Electron effective mass- concept of hole.

**UNIT 2****SEMICONDUCTOR PHYSICS****9**

Elemental and compound semiconductors - Intrinsic semiconductor – carrier concentration derivation

– Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – Extrinsic semiconductor - Derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

### **UNIT 3                      MAGNETISM AND SUPERCONDUCTIVITY                      9**

Origin of magnetic moment – Bohr magneton – Comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti-ferromagnetic materials – Ferrites and its applications. Superconductivity: properties – Type I and Type II superconductors – High T<sub>c</sub> superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

### **UNIT 4      DIELECTRIC AND OPTICAL PROPERTIES OF MATERIALS                      9**

Electrical susceptibility – Dielectric constant – Electronic, ionic, orientational and space charge polarization – Frequency and temperature dependence of polarisation – Internal field – Claussius – Mosotti relation (derivation) – Dielectric loss - Light absorption - Luminescence, Phosphors and white LEDs -Birefringence, Dichroism - Electro-optic effect and amplitude modulators.

### **UNIT 5                                      NANO DEVICES                                      9**

Introduction - Quantum confinement – Quantum structures: quantum wells, wires and dots — Band gap of nano-materials - Classification of nanomaterials - Thin Film Growth, Ball Milling, Sol-Gel – Properties and applications – Carbon nanotubes: types and applications.

#### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Grasp the fundamental principles of classical and quantum mechanics, semiconductor physics, magnetic properties of materials, dielectric materials, superconducting materials, optical and nano materials and acquire insights into the essentials of emerging engineering materials.

**CO2:** Demonstrate a comprehensive understanding of classical and quantum mechanics, semiconductor physics, magnetic properties of materials, dielectric materials, and superconducting materials optical and nano materials, enabling the adept resolution of practical engineering challenges.

**CO3:** Apply the foundational theories of classical and quantum mechanics, semiconductor physics, and the properties of magnetic, dielectric, superconducting materials, optical and nano materials to seamlessly integrate knowledge into diverse engineering applications.

**CO4:** Classify the semiconductor, magnetic, dielectric, and superconducting properties of materials, utilizing this systematic categorization to effectively address engineering problems in Material Science.

**CO5:** Analyze the foundational knowledge of conductors, semiconductors, magnetic, dielectric, superconducting materials, optical and nano materials to formulate and implement solutions for contemporary engineering issues.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Arumugam M., Materials Science. Anuradha publishers, 2010.
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
3. The Physics and Chemistry of NanoSolids by Frank J. Owens and Charles P. Poole Jr, Wiley-Interscience, 2008.

**REFERENCES:**

1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
2. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011
3. Handbook of nanoscience, Eng. & Technology by W. Gaddand, D. Bernner, S.L. Solnki& G.J. Infrate (Eds) , CRC press 2002.
4. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
5. Amnon Yariv and P.Yeh, Photonics: Optical Electronics in Modern Communications, Oxford Univ.Press, 2007
6. Nanostructure and Nanomaterials: Synthesis , Properties and Application by G. Cao, Imperial College Press, 2004.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                | 3   | 2   | 1   | -   | -   | -   | 1   | -   | -   | -     | -     | 1     | -     | -     | -     |
| CO2                                                                                                                                | 3   | 2   | -   | -   | 1   | -   | 1   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO3                                                                                                                                | 3   | 2   | 1   | -   | 1   | -   | 1   | -   | -   | 1     | -     | 1     | -     | -     | -     |
| CO4                                                                                                                                | 3   | 2   | 1   | -   | 1   | -   | 1   | -   | -   | 1     | -     | 1     | -     | -     | -     |
| CO5                                                                                                                                | 3   | 2   | 1   | -   | 1   | -   | 1   | -   | -   | 1     | -     | 1     | -     | -     | -     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY                     | APPROVED BY                               |
|----------------------------------------|-------------------------------------------|
| Dr. T.Jayaprakash- Professor / Physics | Dr.M.Kumaresan – Professor & Head/<br>S&H |
| Name and Department                    | Name and Department of BoS<br>Chairman    |

U23CS201

**PYTHON PROGRAMMING AND PRACTICES**

Category : ESC

SDG:4

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. To understand and develop programs using Python.
2. To use the concepts of strings, control flow, data types in python programs.
3. To create programs using list, tuples, dictionaries, and files concept in Python.
4. To analyze image processing, networking and object-oriented programming in Python.
5. To create new ideas for problems in real world application using python.

**UNIT 1 INTRODUCTION TO PYTHON PROGRAMMING 6**

Introduction to Python Programming- Python Interpreter and Interactive Mode -Variables- Numerical types- Arithmetic operators and Expressions- Psuedo Code - Values and types: int, float, Boolean - Variables, Expressions, Statements -Illustrative Problems.

**UNIT 2 DATA TYPES, CONTROL FLOW, STRINGS 8**

Control Flow -conditional (if), Alternative (if-else), Chained conditional (if-else if-else)- Iteration: state, while, for, break, continue, pass - Strings: string slices, immutability, string functions and methods, string module, Regular expression, Pattern matching. - Illustrative Problems.

**UNIT 3 LISTS, TUPLES DICTIONARIES AND FUNCTIONS 10**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters- Tuples: tuple assignment, tuple as return value- Dictionaries: operations and methods, advanced list processing – list comprehension. Functions and User Defined Functions: Simple and Mathematical Built-in Functions, Recursion -Illustrative Problems.

**UNIT 4 FILES AND OOPS CONCEPT IN PYTHON 10**

Files, Text files, reading and writing files-format operator; Files and exception handling - Introduction to Object Oriented Programming – Basic principles of Object Oriented Programming in Python – Class Definition-Object Creation - Inheritance, Composition, Operator Overloading.

**UNIT 5 IMAGE PROCESSING & NETWORKING WITH PYTHON AND APPLICATIONS 11**

Basics of Image processing- Image File Formats – Introduction to Classic Image Processing Algorithm- Image Processing Tools-Fundamentals of Networking- Introduction to Python Sockets- Simple Client/Server Programming-Python Applications.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Explain the concepts of Python.

**CO2:** Use appropriate constructs to represent data.

**CO3:** Write programs using different constructs in Python.

**CO4:** Develop real world applications in image processing and networking.

**CO5:** Develop various simple programs for real world application using python.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Python Programming for Beginners: Skyrocket Your Code and Master Python in Less than a Week. Discover the Foolproof, Practical Route to Uncover Insider Hacks, Unlock New Opportunities, and Revolution Kindle Edition by Kit Jackson (Author), 31 May 2023
2. Introducing Python, 2nd Edition, by Bill Lubanovic, O'Reilly Media, Inc., 2019.

**REFERENCES:**

1. Python Programming for Beginners, ISBN-13-979-8870875248, Narry Prince, 2023.
2. Python Programming, West McKinney, ISBN-13-979-8870534817, 2023.
3. Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications, by Robert Oliver, ISBN-13-978-163610037, 2023.
4. Mastering Python Networking: Utilize Python packages and frameworks for network automation, monitoring, cloud, and management by Eric Chou, 2023.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                         |     |     |     |     |     |     |     |     |     |      |       |       |       |       |      |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-------|-------|-------|-------|------|
| CO                                                                                                                                           | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1                                                                                                                                          | 2   | -   | 1   | -   | -   | -   | -   | -   | 1   | 1    | -     | 3     | 1     | 1     | -    |
| CO2                                                                                                                                          | 2   | -   | 1   | -   | -   | -   | -   | -   | 1   | 1    | -     | 3     | 1     | 1     | -    |
| CO3                                                                                                                                          | 2   | -   | 1   | -   | -   | -   | -   | -   | 1   | 1    | -     | 3     | 1     | 1     | -    |
| CO4                                                                                                                                          | 2   | 3   | 1   | -   | 3   | -   | -   | 1   | 1   | 1    | 3     | 3     | 1     | 1     | -    |
| CO5                                                                                                                                          | 2   | 3   | 1   | 1   | 3   | -   | -   | 1   | 3   | 1    | 3     | 3     | 1     | 1     | -    |
| <b>Correlation levels:    1 – low                      2 – medium                      3 – high                      “-“- no correlation</b> |     |     |     |     |     |     |     |     |     |      |       |       |       |       |      |

| <b>COURSE DESIGNED BY</b>                                                  | <b>APPROVED BY</b>                         |
|----------------------------------------------------------------------------|--------------------------------------------|
| Dr.S.Pathur Nisha – Professor & Head/ CSE & Prof. Evance Leethail – AP/CSE | Dr.S.Pathur Nisha – Professor & Head/ CSE  |
| <b>Name and Department</b>                                                 | <b>Name and Department of BoS Chairman</b> |

U23CS202

SDG:4

**DIGITAL LOGIC CIRCUITS**

Category : ESC

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 2 | 3 |

**COURSE OBJECTIVE:**

1. To represent information in various number systems.
2. To introduce different methods to simplify Boolean function and realize the logic circuits.
3. To analyze logic systems and able to design combinational circuit using Karnaugh Map.
4. To analyze synchronous sequential circuits.
5. To understand A/D and D/A converters.

**UNIT 1                    MINIMIZATION TECHNIQUES AND LOGIC GATES                    7**

Number Systems and their conversions - Complements – Signed Binary Numbers – Binary Codes (BCD, Gray) – Binary Logic -Boolean Algebra: Definitions – Basic and Axiomatic –Theorems of Boolean Algebra – Boolean functions: Realization of functions using Logic gates.

**UNIT 2                    GATE LEVEL MINIMIZATION                    7**

Canonical and Standard Forms of Boolean functions – Minimization of functions using Karnaugh Map – Don't-Care Conditions – NAND and NOR Implementation– Exclusive- OR function – Minimization of functions using Quine- McCluskey method.

**UNIT 3                    COMBINATIONAL CIRCUITS                    6**

Analysis procedure – Design procedure –Half Adder – Full Adder - Half Subtractor – Full Subtractor– Magnitude Comparator – Decoders – Encoders – Multiplexers – Demultiplexers.

**UNIT 4                    SEQUENTIAL CIRCUITS                    6**

Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits - Registers – Counters.

**UNIT 5                    D/A AND A/D CONVERTERS                    4**

Ladder type D/A converter - Dual slope A/D converter - Successive approximation A/D converter- Case study of DAC0800 and ADC0809 chips.

**PRACTICAL EXERCISES:**

1. Verification of Boolean functions using basic gates.
2. Implement Half Adder and Full Adder using logic gates.
3. Implement Half Subtractor and Full Subtractor using logic gates.
4. Design and Implementation of 4-bit Adder and Subtractor circuit.
5. Design and Implementation of 4-bit binary to gray code converters.
6. Design of Multiplexer and Demultiplexer circuits using Verilog HDL.
7. Design and implementation of decoders and encoders using Verilog HDL.
8. Implementation of 2-bit Magnitude Comparator using logic gates.
9. Design and implement various Shift Registers.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Recall the number systems and their conversions and complements, Boolean algebra and theorems.

**CO2:** Interpret the realization of Boolean functions using logic gates, signed binary numbers and binary codes.

**CO3:** Explain the analysis and design procedure of combinational and sequential circuits and various A/D and D/A converters.

**CO4:** Solve the canonical and standard forms of Boolean functions using K-map, Quine-McCluskey method.

**CO5:** Analyze NAND, NOR and Ex-OR implementation using logic gates, DAC and ADC chips.

**CO6:** Design half and full adder/Subtractor, magnitude comparator, encoder and decoder, multiplexer and demultiplexer, flip flops, registers and counters.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Thomas.L.Floyd, "Digital Fundamentals", 11 Edition, Prentice Hall, 2021
2. M. Morris Mano, Michael D. Ciletti, "Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018.
3. Salivahanan S. & Arivazhagan S., "Digital Circuits and Design", 5th Edition, Oxford University Press, New Delhi, 2018.

**REFERENCES:**

1. G. K. Kharate, Digital Electronics, Oxford University Press, Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2017
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3. <https://nptel.ac.in/courses/117/105/117105080/>
4. [https://www.oreilly.com/library/view/fundamentals of digital/9781118969304/9781118969304c01.xhtml](https://www.oreilly.com/library/view/fundamentals-of-digital/9781118969304/9781118969304c01.xhtml).

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                  | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO2                                  | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO3                                  | 3   | 3   | 3   | 2   | -   | -   | -   | -   | -   | 2     | -     | -     | 1     | -     | 1     |
| CO4                                  | 3   | 3   | 2   | 2   | -   | -   | -   | -   | -   | -     | -     | -     | -     | -     | -     |
| CO5                                  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | 2     | -     | -     | 1     | -     | 1     |

|                                                                                                                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO6                                                                                                                                | 3 | 3 | 3 | 3 | - | - | - | - | - | 2 | - | - | 1 | - | 1 |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY                                                           | APPROVED BY                                  |
|------------------------------------------------------------------------------|----------------------------------------------|
| Dr.S.Pathur Nisha – Professor & Head/ CSE<br>& Prof. V Satheeswaran – AP/ESE | Dr.S.Pathur Nisha – Professor & Head/<br>CSE |
| Name and Department                                                          | Name and Department of BoS<br>Chairman       |

U23HS202

TAMIL AND TECHNOLOGY

Category : HSMC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 1 | 0 | 0 | 1 |

**COURSE OBJECTIVE:**

1. To learn the extensive literature of classical Tamil.
2. To review the fine arts heritage of Tamil culture.
3. To realize the contribution in Indian freedom struggle.

**UNIT 1****TAMIL AND TECHNOLOGY****3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT 2****DESIGN AND CONSTRUCTION TECHNOLOGY****3**

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)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**UNIT 3****MANUFACTURING TECHNOLOGY****3**

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.

**UNIT 4****AGRICULTURE AND IRRIGATION TECHNOLOGY****3**

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu 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.

**UNIT 5 SCIENTIFIC TAMIL & TAMIL COMPUTING****3**

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.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Understand the extensive literature of Tamil and its classical nature (understand).

**CO2:** Understand the heritage of sculpture, painting and musical instruments of ancient people (understand).

**CO3:** Review on folk and martial arts of Tamil people (understand).

**CO4:** Realization of thina concepts, trade and victory of chozha dynasty (understand).

**CO5:** Understand the contribution of Tamils in Indian freedom struggle, self-esteem movement and siddha medicine (understand).

**TOTAL: 15 PERIODS****TEXT BOOKS:**

1. தமிழகவரலாறு – மக்களும்பண்பாடும்– .கக.ககபிள்ளை (வவையீடு): தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்.
2. கணினித்தமிழ் – முளனவர்இல. சுந்தரம் . (விகடன்பிரசுரம் ).
3. கீழடி – எவளகநதிக்களரயில்சங்ககாலநகரநாகரிகம் (வதால்லியல்துளை (வவையீடு).

**REFERENCES:**

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. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
3. National The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Interl Institute of Tamil Studies).
4. Keeladi - ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
6. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |      |      |      |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|------|------|------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
| CO1                                  | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -    | -    | -    |
| CO2                                  | -   | -   | -   | -   | -   | -   | 3   | 3   | -   | 2     | -     | 3     | -    | -    | -    |

|                                                                                                                                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO3                                                                                                                                    | - | - | - | - | - | - | 3 | 3 | - | 2 | - | 3 | - | - | - |
| CO4                                                                                                                                    | - | - | - | - | - | - | 3 | 3 | - | 2 | - | 3 | - | - | - |
| CO5                                                                                                                                    | - | - | - | - | - | - | 3 | 3 | - | 2 | - | 3 | - | - | - |
|                                                                                                                                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Correlation levels:    1 – low                      2 – medium                      3 – high                      “-“ - no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY              | APPROVED BY                               |
|---------------------------------|-------------------------------------------|
| Prof. A.Prabhakaran – AP/ Tamil | Dr.M.Kumaresan – Professor & Head/<br>S&H |
| Name and Department             | Name and Department of BoS Chairman       |

U23EE202

SDG:17

CAREER ENHANCEMENT TRAINING II

Category : EEC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 2 | 0 | 0 | 1 |

**COURSE OBJECTIVE:**

1. To help students demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
2. To enable students critically evaluate various real-life situations by resorting to an analysis of key issues and factors.
3. To help them improve their communicative English for Interview and corporate readiness.

|                                                                                                 |                                     |          |
|-------------------------------------------------------------------------------------------------|-------------------------------------|----------|
| <b>UNIT 1</b>                                                                                   | <b>NUMERICAL REASONING</b>          | <b>6</b> |
| Problems on Ages – Arithmetic Reasoning - Ratio & Proportion – Alligation & Mixtures            |                                     |          |
| <b>UNIT 2</b>                                                                                   | <b>GEOMETRY &amp; SHAPES</b>        | <b>6</b> |
| Mensuration 2D –Mensuration 3D – Height – Distance - Perimeter – Area – Volume                  |                                     |          |
| <b>UNIT 3</b>                                                                                   | <b>COMBINATIONS &amp; CALENDARS</b> | <b>6</b> |
| Permutation and Combination – Probability-Circular Permutation - Clocks and Calendars           |                                     |          |
| <b>UNIT 4</b>                                                                                   | <b>CLASSIC REASONING</b>            | <b>6</b> |
| Blood Relation – Direction Sense – Seating Arrangement – Syllogism – Statement & Conclusion     |                                     |          |
| <b>UNIT 5</b>                                                                                   | <b>VERBAL APTITUDE</b>              | <b>6</b> |
| Synonyms Antonyms – Spotting Error – Sentence Correction – Change of Voice – Change of Speech – |                                     |          |

Spelling – Reading Comprehension – Select Words – Closet Test.

### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Demonstrate problem-solving skills and critical thinking abilities in the context of Engineering Aptitude.

**CO2:** To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes.

**CO3:** Evaluate and interpret aptitude test results to identify areas of improvement and develop a personalized study plan for further enhancement.

**CO4:** Use the correct Grammar, Vocabulary, Spelling and Comprehension ensuring the enhancement their language skills and the ability to use the skills for effective Communication

**TOTAL: 30 PERIODS**

### **TEXT BOOKS:**

1. The Pearson Guide to Quantitative Aptitude For Competitive Examinations, Dinesh Khattar. Pearson
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication
3. A modern Approach to Verbal and Non-Verbal Reasoning R.s. Aggarwal

### **REFERENCES:**

1. Quantitative Aptitude for CAT, Arun Sharma.
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication.
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs, Sarvesh K. Verma.
4. Wiley's Exam Expert Quantitative Ability for CAT, 2ed, Ashu Jain.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                   |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|----------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                    | 3   | 3   | 3   | 3   | -   | -   | -   | -   | -   | 1     | -     | -     |       |       |       |
| CO2                                                                                    | 3   | 2   | 1   | 3   | -   | -   | -   | -   | -   | 1     | -     | -     |       |       |       |
| CO3                                                                                    | 3   | 1   | 1   | 2   | -   | -   | -   | -   | -   | 1     | -     | -     |       |       |       |
| CO4                                                                                    | 1   | 1   | 1   | 1   | -   | -   | -   | -   | -   | 3     | -     | -     |       |       |       |
| CO5                                                                                    | -   | -   | -   | -   | -   | -   | -   | -   | -   | -     | -     | -     |       |       |       |
| Correlation level:      1 – low      2 – medium      3 – high      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY              | APPROVED BY                               |
|---------------------------------|-------------------------------------------|
| Prof. Ramesh Raja – Head/ NCPIR | Dr.S.Pathur Nisha – Professor & Head/ CSE |
| Name and Department             | Name and Department of BoS Chairman       |

U23GE212

ENGINEERING PRACTICES LABORATORY

Category : ESC

SDG:4

(Common for CSE &amp; IT)

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 2 | 1 |

**COURSE OBJECTIVE:**

1. Connecting various pipe fittings used in common household plumbing work; Planning; making joints in wood materials used in common household wood work.
2. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning and drilling in parts.
3. Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Wiring various electrical joints in common household electrical wire work.
5. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components.

**LIST OF EXPERIMENTS****GROUP A (CIVIL & MECHANICAL)****PART I-CIVIL ENGINEERING PRACTICES****Plumbing Work:**

1. Connecting various basic pipe fittings like valves, taps and other components which are commonly used in household.

**Wood Work:**

2. Planning
3. Making T- Joint.

**PART II-MECHANICAL ENGINEERING PRACTICES****Welding Work:**

4. Welding of Butt Joints using arc welding.
5. Practicing gas welding

**Basic Machining Work:**

6. (Simple)Turning.
7. (Simple)Drilling.

**Machine Assembly Practice:**

8. Study of Centrifugal pump.
9. Study of Air conditioner.

**Sheet Metal Work:**

10. Making of a square tray.

**GROUP B (ELECTRICAL & ELECTRONICS)****PART I- ELECTRICAL ENGINEERING PRACTICES**

1. Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin sockets.
2. Staircase wiring.
3. Fluorescent Lamp wiring with introduction LED types.

**PART II- ELECTRONICS ENGINEERING PRACTICES**

4. Study of Electronic components and equipments – Resistor, color coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
5. Soldering simple electronic circuits and checking continuity.
6. Assembly and dismantle of LED TV.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Fabricate carpentry components and pipe connections including plumbing works.

**CO2:** Use welding equipments to join the structures.

**CO3:** Carry out the basic assembling and machining operations; Make the models using sheet metal.

**CO4:** Carry out basic home electrical works and appliances and to measure the electrical quantities.

**CO5:** Soldering the simple electronic circuits; Assemble the simple electronic devices.

**TOTAL: 30 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1                                  | 2   | 2   | 2   | 2   | 0   | 0   | 0   | 0   | 1   | 2     | 2     | 1     | 0     | 0     | 0    |
| CO2                                  | 2   | 2   | 2   | 2   | 0   | 0   | 0   | 0   | 1   | 2     | 2     | 1     | 0     | 0     | 0    |
| CO3                                  | 2   | 2   | 2   | 2   | 0   | 0   | 0   | 0   | 1   | 2     | 2     | 1     | 0     | 0     | 0    |

|                                                                                                                                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO4                                                                                                                                    | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 |
| CO5                                                                                                                                    | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 |
| Correlation levels:    1 – low                      2 – medium                      3 – high                      “-“ - no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY                                                        | APPROVED BY                               |
|---------------------------------------------------------------------------|-------------------------------------------|
| Prof. S.Satheeshkumar – AP/Mechanical & Prof.<br>V. Satheeswaran – AP/ECE | Dr.S.Pathur Nisha – Professor & Head/ CSE |
| Name and Department                                                       | Name and Department of BoS Chairman       |

U23GE213

SDG:4

**ENGINEERING GRAPHICS LABORATORY**

Category : ESC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 2 | 1 |

**COURSE OBJECTIVE:**

1. To improve imagination skills.
2. To develop graphic skills for communication of concepts, ideas and design of Engineering products.
3. To learn drafting & modeling packages in orthographic and isometric drawings.
4. To train the usage of 2D and 3D modeling.
5. To learn graphical representation of machine components.

**INTRODUCTION TO CAD**

Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations.

**ORTHOGRAPHIC PROJECTIONS**

Systems of projections, conventions and application to orthographic projections - simple objects. Lines, planes, simple solids.

**ISOMETRIC PROJECTIONS**

Principles of isometric projection- Isometric scale; Isometric views

1. Introduction to Computer Aided Drafting software packages.
2. Practice on features of a Computer Aided Drafting package.
3. Practice Sheet -Title Block.

4. Loci of Points.
5. Engineering curves.
6. Projection of Lines.
7. Projection of Planes.
8. Projection of Solids.
9. Drafting of Isometric Projection.
10. Drafting of Orthographic views of simple parts.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Understand the standards and common cases as well as dimensioning in technical drawings development

**CO2:** Communicate the technical ideas in the form of drawings.

**CO3:** Apply the drawing skills in representing various geometrical features.

**CO4:** Develop orthographic projections and isometric views of various objects.

**CO5:** Sketch simple objects and their pictorial views using CAD.

**TOTAL: 30 PERIODS**

**TEXT BOOKS:**

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHILearning, Eastern Economy editions.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                              |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-----------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                               | 1   | -   | 2   | -   | 2   | -   | -   | -   | 1   | -     | -     | 1     | 2     | 2     | 1     |
| CO2                                                                                                                               | 1   | -   | 2   | -   | 2   | -   | -   | -   | 1   | -     | -     | 1     | 2     | 2     | 1     |
| CO3                                                                                                                               | 1   | -   | 2   | -   | 2   | -   | -   | -   | 1   | -     | -     | 1     | 2     | 2     | 1     |
| CO4                                                                                                                               | 1   | -   | 2   | -   | 2   | -   | -   | -   | 1   | -     | -     | 1     | 2     | 2     | 1     |
| CO5                                                                                                                               | 1   | -   | 2   | -   | 2   | -   | -   | -   | 1   | -     | -     | 1     | 2     | 2     | 1     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“ no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| <b>COURSE DESIGNED BY</b>          | <b>APPROVED BY</b>                         |
|------------------------------------|--------------------------------------------|
| Prof. A. Balthilak – AP/Mechanical | Dr.S.Pathur Nisha – Professor & Head/ CSE  |
| <b>Name and Department</b>         | <b>Name and Department of BoS Chairman</b> |

## SEMESTER III

|                 |                                       |                       |          |          |          |
|-----------------|---------------------------------------|-----------------------|----------|----------|----------|
| <b>U23MA306</b> | <b>PROBABILITY AND LINEAR ALGEBRA</b> | <b>Category : BSC</b> |          |          |          |
| <b>SDG:4</b>    |                                       | <b>L</b>              | <b>T</b> | <b>P</b> | <b>C</b> |
|                 |                                       | <b>3</b>              | <b>1</b> | <b>0</b> | <b>4</b> |

**COURSE OBJECTIVE:**

1. To acquire the basic concept of discrete and continuous random variables.
2. To measure uncertainty using various probability distributions.
3. To describe the fundamental ideas behind random variables in two dimensions.
4. To understand postulates of vector spaces and linear transformations.
5. To comprehend the ideas behind inner product spaces.

|               |                         |            |
|---------------|-------------------------|------------|
| <b>UNIT 1</b> | <b>RANDOM VARIABLES</b> | <b>9+3</b> |
|---------------|-------------------------|------------|

Random Variables – Discrete and Continuous random variables – Probability mass and Probability density functions – Mean and Variance. Application of Random Variables in Data Handling in Engineering Filed.

|               |                                  |            |
|---------------|----------------------------------|------------|
| <b>UNIT 2</b> | <b>PROBABILITY DISTRIBUTIONS</b> | <b>9+3</b> |
|---------------|----------------------------------|------------|

Discrete Distributions: Binomial distribution – Poisson distribution – Continuous Distributions: Uniform distribution – Exponential distribution – Normal distribution. Application in Broadcasting and Cloud Computing Problems.

|               |                                         |            |
|---------------|-----------------------------------------|------------|
| <b>UNIT 3</b> | <b>TWO DIMENSIONAL RANDOM VARIABLES</b> | <b>9+3</b> |
|---------------|-----------------------------------------|------------|

Introduction – Joint probability distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression. Application: Medical imaging.

|               |                      |            |
|---------------|----------------------|------------|
| <b>UNIT 4</b> | <b>VECTOR SPACES</b> | <b>9+3</b> |
|---------------|----------------------|------------|

Vector spaces – Subspaces – Linear combination, span, linear independence and dependence – Null space, Column space and row space – Basis and dimension of a vector space – Rank and nullity. Application: Digital Image Enhancement Using Transformations.

|               |                             |            |
|---------------|-----------------------------|------------|
| <b>UNIT 5</b> | <b>INNER PRODUCT SPACES</b> | <b>9+3</b> |
|---------------|-----------------------------|------------|

Inner product, length, angle and orthogonality – orthogonal sets – orthogonal projections – Inner product spaces – orthonormal basis; Gram-Schmidt process. Application: Designing the Movement of Robotic Arms.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Understand the fundamental knowledge of the concepts of discrete and continuous random variables.

**CO2:** Classify the problems using probability distributions and apply appropriate distributions.

**CO3:** Comprehend the basic concepts of two-dimensional random variables and apply in engineering

applications.

**CO4:** Analyze the essential subspace properties of a vector space to get its basis and dimension.

**CO5:** Compute inner products on a real vector space and compute angle and orthogonality in inner product spaces to solve application problems

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Steven J. Leon., “Linear Algebra with Application” Ninth Edition, Pearson, 2015.
2. Gilbert Strang, Linear Algebra, 5th Edition, ANE Books, 2016.
3. Ross. S.M., “Introduction to Probability and Statistics for Engineers and Scientists”, Elsevier, New Delhi, 5th Edition, 2014.

**REFERENCES:**

1. Friedberg, A.H., Insel, A.J. and Spence, L., Linear Algebra, Prentice Hall of India, New Delhi, 2004.
2. David C.Lay., “Linear Algebra And Its Applications” 5th Edition, 2015.
3. Kumaresan, S., —Linear Algebra – A Geometric Approach, Prentice – Hall of India, New Delhi, Reprint, 2010.
4. Douglas C. Montgomery & George C. Runger, "Applied Statistics and Probability for Engineers ", 7th Edition, John Wiley and Sons, USA, 2018.
5. Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                | 3   | 3   | 1   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1     | -     | -     | -     |
| CO2                                                                                                                                | 3   | 3   | 1   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1     | -     | -     | -     |
| CO3                                                                                                                                | 3   | 3   | 1   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1     | -     | -     | -     |
| CO4                                                                                                                                | 3   | 2   | 1   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1     | -     | -     | -     |
| CO5                                                                                                                                | 3   | 2   | 1   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1     | -     | -     | -     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“– no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY              | APPROVED BY                                      |
|---------------------------------|--------------------------------------------------|
| Dr. N. Vithya- ASP/ Mathematics | Dr. K.Parimala Gandhi – Professor & Head/<br>S&H |
| Name and Department             | Name and Department of BoS Chairman              |

**U23CS301**  
**SDG:4**

## **DATA STRUCTURES AND ALGORITHMS**

**Category : PCC**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

### **COURSE OBJECTIVE:**

1. To introduce and learn about the concepts of linear data structures.
2. To introduce and learn about the concept of non-linear data structures.
3. To learn about the concepts of the graph and graph traversal structures.
4. To understand the concept of sorting and searching.
5. To get exposure on various algorithm design and analysis techniques.

### **UNIT 1 LINEAR DATA STRUCTURE 9+3**

Abstract Data types (ADT) - List ADT - Array based implantation - Linked Lists implementation - Singly Linked Lists - Doubly Linked Lists - Stacks ADT : Operations - Application of stack - Queues ADT : Operations - Circular Queue - Applications of Queues.

### **UNIT 2 NON LINEAR DATA STRUCTURE : TREES 9+3**

Tree ADT – Tree Traversal: In-order, Pre-order, Post order – Binary Search Tree ADT – Application of Trees : AVL Trees – B+ trees – B- Trees – Heap Data structure : Operations – Binary heap

### **UNIT 3 GRAPH ALGORITHMS 9+3**

Graph: Terminologies – Representation of Graph - Graph traversal – Breadth-first traversal – Depth-first traversal - Topological sort – Shortest path algorithm - Dijkstra's algorithm- Minimum Spanning Tree Algorithm: Prim's , Kruskal algorithm

### **UNIT 4 SORTING AND SEARCHING ALGORITHMS 9+3**

Searching – Types of Searching : Linear Search , Binary Search – Sorting : Insertion Sort – Selection Sort – Bubble Sort – Quick Sort – Analysis and Comparison of Sorting Algorithms – Hashing: Hash table – Hash functions –Resolving Collision Techniques: Separate chaining – Open addressing – Rehashing – Extendible Hashing

### **UNIT 5 FUNDAMENTALS OF ALGORITHMS AND ITS ANALYSIS 9+3**

Algorithm, Notation of Algorithm, Performance Analysis of Algorithm : Space complexity, Time

complexity, Asymptotic Notation - Big (O) Notation, Omega Notation, Theta Notation and Little (o) notation, Recurrences, Probabilistic Analysis, Disjoint Set Operations, Union And Find Algorithms, Amortized Analysis

### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Design and implement linear data structures, such as lists, queues, and stacks, according to the needs of different applications.

**CO2:** Design and analyze tree structures and Heap.

**CO3:** Apply graph algorithms to solve problems and analyze their efficiency.

**CO4:** Critically analyze and implement various searching, sorting algorithms with its competence.

**CO5:** Analyze the performance of algorithms, time and space complexity of algorithms.

**TOTAL: 60 PERIODS**

### **TEXT BOOKS:**

- 1."Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss (4th Edition, 2020)
- 2.“Data Structures And Algorithms In C++” by Michael T. Goodrich (2nd Edition, 2011)

### **REFERENCES:**

- 1.“Data structures using C++” by Patil, Varsha H(2nd Edition, 2012)
- 2."Problem Solving with Algorithms and Data Structures Using C++" by Bradley N. Miller and David L. Ranum (2nd Edition, 2010)

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                        |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-----------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                          | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                         | 2   | 3   | 1   | 2   | 1   | -   | -   | -   | 1   | -     | 2     | 3     | 2     | 1     | 1     |
| CO2                                                                                                                         | 1   | 2   | 1   | 2   | 2   | -   | -   | -   | 2   | -     | 2     | 2     | 2     | 2     | 2     |
| CO3                                                                                                                         | 2   | 3   | 1   | 2   | 3   | -   | -   | -   | 2   | -     | 1     | 2     | 2     | 1     | 1     |
| CO4                                                                                                                         | 1   | 2   | 1   | 2   | 1   | -   | -   | -   | 1   | -     | 2     | 3     | 2     | 2     | 2     |
| CO5                                                                                                                         | 2   | 1   | -   | 1   | 1   | -   | -   | -   | 1   | -     | 2     | 3     | 2     | 3     | 2     |
| Correlation levels:      1 – low                  2 – medium                  3 – high                  “-”- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| <b>COURSE DESIGNED BY</b>  | <b>APPROVED BY</b>                         |
|----------------------------|--------------------------------------------|
| Prof. P.Aruna- AP/CSE      | Dr.S.Pathur Nisha – Professor & Head / CSE |
| <b>Name and Department</b> | <b>Name and Department of BoS Chairman</b> |

|          |                                   | Category : PCC |   |   |   |
|----------|-----------------------------------|----------------|---|---|---|
| U23CS302 | OBJECT ORIENTED PROGRAMMING USING | L              | T | P | C |
| SDG:4    | JAVA                              | 3              | 0 | 0 | 0 |

**COURSE OBJECTIVE:**

1. To understand and develop programs using Java, leveraging object-oriented programming principles.
2. To create and manage Java programs utilizing constructors, destructors, member functions, static members, and nested classes.
3. To use the concepts of classes, objects, inheritance, polymorphism, and function overloading in Java programs.
4. To handle exceptions and implement multithreading in Java for efficient and robust application development.
5. To perform file operations and implement networking using Java, applying relevant classes and techniques for real-world applications.

**UNIT 1 INTRODUCTION TO OOPS AND JAVA 5**

Introduction to Java and OOP - Key Concepts of OOP - Advantages of OOP - Java Basics - Control Structures – Array.

**UNIT 2 CLASSES AND OBJECTS 8**

Defining Classes and Objects - Access Specifiers and Modifiers - Defining Member – Functions - Static Members and Methods - Constructors and Destructors - Inline Methods and Nested Classes - Object Assignment and Management - Arrays of Objects - Passing Objects to Methods - Returning Objects from Methods.

**UNIT 3 INHERITANCE AND OVERLOADING 10**

**Inheritance:** Introduction, purpose and benefits - Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance using Interface and Hybrid Inheritance - Method Overriding - Use of ‘super’ keyword.

**Polymorphism:** Concept and Runtime polymorphism - Abstract Classes and Methods - Use of ‘final’ keyword - Protected Members - use of ‘protected’ keyword - Type Casting in Inheritance – Interfaces.

**Function Overloading:** Introduction, Syntax and Rules - Difference between overloading and overriding - Automatic Type Conversion - Overloading in Inheritance.

**UNIT 4 EXCEPTION HANDLING AND MULTITHREADING 11**

**Exception Handling:** Definition and Purpose - Checked Exceptions - Unchecked Exceptions - Errors - Throwable, Exception, and Error classes - try-catch Blocks - Multiple catch blocks - finally Block - Nested try-catch - Common Java Exceptions – User defined Exceptions.

**Java Multithreading:** Introduction - Processes vs. Threads - Creating Threads - Extending ‘Thread’ class - Implementing ‘Runnable’ interface – ‘synchronized’ keyword - Locks and monitors

- Thread Lifecycle.

**UNIT 5****FILES AND JAVA NETWORKING****11**

**Working with Files:** Input Stream, Output Stream, Reader, Writer - Creating, deleting, and inspecting file properties - Reading from and writing to text files - Renaming, moving, and copying files using Files class - EOF Detection - Updating a File - Command Line Arguments Handling.

**Networking with Java:** TCP Sockets - Using 'ServerSocket' and 'Socket' classes - UDP Sockets - Using 'Datagram Socket' and 'Datagram Packet' - Networking Utilities - Using 'InetAddress' class.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Explain the fundamental concepts of Object-Oriented Programming and Java, including key OOP principles and Java basics.

**CO2:** Use appropriate Java constructs such as classes, objects, to represent and manage data.

**CO3:** Write Java programs incorporating control structures, arrays, inheritance, and polymorphism to solve complex problems.

**CO4:** Handle exceptions and implement exception handling, and multithreading in Java to develop efficient and robust applications.

**CO5:** Perform file operations and implement networking using Java to create practical, real-world applications.

**TOTAL: 45 PERIODS****TEXT BOOKS:**

1. Java: The Complete Reference, Herbert Schildt, McGraw Hill Education, 12th Edition 2022 (Units 1,2, 3,4,5)
2. Java How to Program, Early Objects, Harvey Deitel & Paul J. Deitel, Pearson, 11th Edition, 2018 (Units 1,2,3,4)
3. Head First Java, Kathy Sierra, Bert Bates, Trisha Gee, O'Reilly Media, Inc. 3rd Edition, May 2022 (Units 1, 2, 3).
4. Effective Java, Joshua Bloch, Addison-Wesley Professional, 3rd Edition, December 2017 (Units 2, 3).

**REFERENCES:**

1. Java Programming: From Beginner to Expert - Durdana Siddiqui, 2022.
2. Learning Java - Marc Loy & Patrick Niemeyer & Daniel Leuck, 6th Edition O'Reilly Media, September 2023.
3. Java Network Programming - Elliotte Rusty Harold, 4th Edition, O'Reilly Media, 2013.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                | 3   | 2   | 1   | -   | 2   | -   | -   | -   | -   | -     | -     | 2     | 2     | -     | -     |
| CO2                                                                                                                                | 3   | 2   | 2   | -   | 3   | -   | -   | -   | -   | -     | -     | 3     | 3     | -     | -     |
| CO3                                                                                                                                | 3   | 2   | 1   | -   | 2   | -   | -   | -   | -   | -     | -     | 2     | 2     | -     | -     |
| CO4                                                                                                                                | 3   | 3   | 3   | -   | 3   | -   | -   | -   | -   | -     | -     | 3     | 3     | -     | -     |
| CO5                                                                                                                                | 3   | 3   | 3   | -   | 3   | -   | -   | -   | -   | -     | -     | 3     | 3     | -     | -     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY             | APPROVED BY                                |
|--------------------------------|--------------------------------------------|
| Prof. Dennis Ebenezer- AP/ CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department            | Name and Department of BoS Chairman        |

**U23CS303**  
**SDG:4**

**COMPUTER ORGANIZATION AND**  
**ARCHITECTURE**

**Category : ESC**  
**L    T    P    C**  
**3    1    0    4**

**COURSE OBJECTIVE:**

1. To learn the basic structure and operations of a computer.
2. To learn the arithmetic and logic unit and implementation of fixed point and floating point arithmetic unit.
3. To learn the basic of pipelined execution.
4. To understand the memory hierarchies, cache memories and virtual memories.
5. To learn the different ways of communication with I/O devices.

**UNIT 1                      BASIC STRUCTURE AND ARITHMETIC UNIT**

**9+3**

Functional Units – Basic Operational Concepts – Performance – Instruction Set Architecture: Instructions and Instruction sequencing – Addressing Modes – RISC and CISC – Fixed Point and Floating Point Operations.

|               |                        |            |
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| <b>UNIT 2</b> | <b>PROCESSING UNIT</b> | <b>9+3</b> |
|---------------|------------------------|------------|

Fundamental Concepts – Instruction Execution – Hardware Components – Instruction Fetch and Execution Steps – Hardwired Control – Micro Programmed Control – Nano Programming.

|               |                             |            |
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| <b>UNIT 3</b> | <b>PIPELINING EXECUTION</b> | <b>9+3</b> |
|---------------|-----------------------------|------------|

Analysis procedure – Design procedure –Half Adder – Full Adder - Half Subtractor – Full Subtractor– Magnitude Comparator – Decoders – Encoders – Multiplexers – Demultiplexers.

|               |                                     |            |
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| <b>UNIT 4</b> | <b>MEMORY SYSTEM &amp; STORAGES</b> | <b>9+3</b> |
|---------------|-------------------------------------|------------|

Basic Concepts – Semiconductor RAM Memories – Read Only Memories – Memory Hierarchy – Cache Memories – Performance Considerations – Virtual Memory – Memory Management Requirements – Secondary Storage Devices.

|               |                         |            |
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| <b>UNIT 5</b> | <b>I/O ORGANIZATION</b> | <b>9+3</b> |
|---------------|-------------------------|------------|

Accessing I/O Devices – Programmed I/O – Interrupt Initiated I/O – Direct Memory Access – Buses – Bus Arbitration – Interconnection Standards: SCSI – USB – SATA – I/O Devices and Processors.

**COURSE OUTCOMES:**

At the end of the course, students would

**C01:** Identify the basics structure of computers, operations and instructions.

**CO2:** Outline the arithmetic operations and working of hardwired micro programmed control.

**CO3:** Comprehend pipelined execution and design control unit.

**CO4:** Recognize the hierarchical memory system including cache memory and virtual memory

**CO5:** Analyze the different ways of communicating with I/O devices and standard I/O interfaces.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Patterson David, A. and Hennessy John L., “Computer Organization and Design: The Hardware / Software Interface”, 6th edition, Harcourt Asia, Morgan Kaufmann, Singapore, 2021.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, 6th edition, McGraw Hill International Edition, New York, 2017

**REFERENCES:**

1. Stallings William, “Computer Organization and Architecture: Designing for Performance”, 10th edition, Pearson Education, New Delhi, 2015.
2. [https://onlinecourses.nptel.ac.in/noc21\\_cs61/preview](https://onlinecourses.nptel.ac.in/noc21_cs61/preview)
3. <https://www.coursera.org/learn/comparch>

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                    |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                     | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | 1     | -     | 1     | 1     | -     | -     |
| CO2                                                                                                                                     | 3   | -   | 2   | -   | -   | -   | -   | -   | -   | 1     | -     | 1     | -     | 1     | -     |
| CO3                                                                                                                                     | 3   | -   | 2   | -   | -   | -   | -   | -   | -   | 1     | -     | 1     | -     | -     | 1     |
| CO4                                                                                                                                     | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | 1     | -     | 1     | -     | -     | -     |
| CO5                                                                                                                                     | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | 3     | -     | 1     | 1     | -     | -     |
| Correlation levels:      1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY            | APPROVED BY                                |
|-------------------------------|--------------------------------------------|
| Prof. V.Satheeswaran - AP/ECE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department           | Name and Department of BoS Chairman        |

U23CS304

SDG:4

**FOUNDATIONS OF DATA SCIENCE****Category : PCC**

|   |   |   |   |
|---|---|---|---|
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**COURSE OBJECTIVE:**

1. To understand the data science fundamentals and process.
2. To learn to describe the data for the data science process.
3. To learn to describe the relationship between data.
4. To utilize the Python libraries for Data Wrangling.
5. To present and interpret data using visualization libraries in Python.

**UNIT 1****INTRODUCTION****9**

Data Science: What is Data Science -Benefits and uses - -Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – building the model– Prerequisites for a Data Scientist - Tools and Skills required-presenting findings and building applications – Basics of NumPy Array.

**UNIT 2 DESCRIBING DATA 9**

Types of Data - Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores, Basics – Pandas data frames. Case Study: Population (Sample Size Estimating the statistics of given population).

**UNIT 3 DESCRIBING RELATIONSHIPS 9**

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of  $r^2$  –multiple regression equations –regression towards the mean. Case Study: Prediction Regression Methodologies with example.

**UNIT 4 PYTHON LIBRARIES FOR DATA WRANGLING 9**

Python for Data Science –Python Libraries – Data Frame Manipulation with numpy and pandas – Exploration Data Analysis – Time Series Dataset – Clustering with Python – Dimensionality Reduction. Python integrated Development Environments (IDE) for Data Science.

**UNIT 5 DATA VISUALIZATION 9**

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three-dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn. Case Study: Graph of Sine and Cosine function.

**PRACTICAL EXERCISES:**

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Stats models and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
  - a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.
  - b. Bivariate analysis: Linear and logistic regression modeling
  - c. Multiple Regression analysis.
  - d. Also compare the results of the above analysis for the two data sets.

6. Apply and explore various plotting functions on UCI data sets.
  - a. Normal curves
  - b. Density and contour plots
  - c. Correlation and scatter plots
  - d. Histograms
  - e. Three-dimensional plotting

7. Visualizing Geographic Data with Base map.

### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Define the data science process.

**CO2:** Understand different types of data descriptions for data science process.

**CO3:** Gain knowledge on relationships between data.

**CO4:** Use the Python Libraries for Data Wrangling.

**CO5:** Apply visualization Libraries in Python to interpret and explore data.

**TOTAL: 75 PERIODS**

### **TEXT BOOKS:**

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017. (Units II and III)
3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Units IV and V)

### **REFERENCES:**

1. Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                                                | 2   | 2   | 1   | 2   | 2   | -   | -   | -   | 1   | 1    | 1    | 2    | 2    | 2    | 1    |
| CO2                                                                                                                                | 2   | 1   | -   | 1   | 1   | -   | -   | -   | 2   | 1    | 1    | 2    | 2    | 1    | -    |
| CO3                                                                                                                                | 2   | 2   | 1   | 2   | 2   | 1   | 1   | -   | 1   | 2    | 1    | 3    | 2    | 2    | 1    |
| CO4                                                                                                                                | 3   | 2   | 2   | 1   | 2   | -   | -   | -   | 1   | 1    | 2    | 2    | 3    | 2    | 2    |
| CO5                                                                                                                                | 2   | 2   | 1   | 2   | 2   | -   | -   | -   | 1   | 1    | 1    | 2    | 2    | 2    | 1    |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY            | APPROVED BY                                |
|-------------------------------|--------------------------------------------|
| Prof. K.Arun Patrick - AP/CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department           | Name and Department of BoS Chairman        |

U23CS312

SDG:4 &amp; 8

**DATA STRUCTURES LABORATORY**

Category : PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 2 | 1 |

**COURSE OBJECTIVE:**

1. To introduce and learn about the concepts of linear data structures.
2. To introduce and learn about the concept of non-linear data structures.
3. To learn about the concept of the graph traversal structures.
4. To understand the concept of sorting and searching.
5. To get exposure on various algorithm design and analysis techniques.

**LIST OF EXPERIMENTS**

1. Stack implementations.
2. Queue implementations.
3. Singly linked list implementations.
4. Binary search tree implementations.
5. Breath first search implementation.
6. Depth first search implementation.
7. Selection sort implementation.
8. Bubble sort implementation.
9. Insertion sort implementation.
10. Binary and Linear Search Implementations.
11. Mini Project.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Design and implement linear data structures, such as lists, queues, and stacks, according to the needs of different applications.

**CO2:** Design and analyze tree structures and Heap.

**CO3:** Apply graph algorithms to solve problems and analyze their efficiency.

**CO4:** Critically analyze and implement various searching, sorting algorithms with its competence.

**CO5:** Analyze the performance of algorithms, time and space complexity of algorithms.

**TOTAL: 30 PERIODS**

**CO's-PO's & PSO's MAPPING**

| CO                                                                                                                                | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|-----------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO1                                                                                                                               | 2   | 3   | 1   | 2   | 1   | -   | -   | -   | 1   | -     | 2     | 3     | 2     | 3     | 1     |
| CO2                                                                                                                               | 1   | 2   | 1   | 2   | 2   | -   | -   | -   | 2   | -     | 2     | 2     | 1     | 2     | 1     |
| CO3                                                                                                                               | 2   | 3   | 1   | 2   | 3   | -   | -   | -   | 2   | -     | 1     | 2     | 2     | 3     | 1     |
| CO4                                                                                                                               | 1   | 2   | 1   | 2   | 1   | -   | -   | -   | 1   | -     | 2     | 3     | 1     | 2     | 1     |
| CO5                                                                                                                               | 2   | 1   | -   | 1   | 1   | -   | -   | -   | 1   | -     | 2     | 3     | 2     | 1     | -     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“ no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY    | APPROVED BY                                |
|-----------------------|--------------------------------------------|
| Prof.P.Aruna- AP/ CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department   | Name and Department of BoS Chairman        |

U23CS312

SDG:4 &amp; 8

**JAVA PROGRAMMING LAB****Category : PCC**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> |

**COURSE OBJECTIVE:**

1. To understand and develop programs using Java, leveraging object-oriented programming principles
2. To create and manage Java programs utilizing constructors, destructors, member functions, static members, and nested classes.
3. To use the concepts of classes, objects, inheritance, polymorphism, and function overloading in Java programs.
4. To handle exceptions and implement multithreading in Java for efficient and robust application development.
5. To perform file operations and implement networking using Java, applying relevant classes and techniques for real-world applications.

**LIST OF EXPERIMENTS**

1. Simple program to experiment branching statements.
2. Simple program to experiment looping statements.
3. Simple program that implements array.
4. Simple program to implement classes and objects.
5. Java program that implements inheritance.
6. Java program that implements overloading.
7. Java program to handle exceptions.
8. Java program to implement multithreading.
9. Java program to perform file operations.
10. Java program to demonstrate basic networking using TCP sockets.
11. Mini Project.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Explain the fundamental concepts of Object-Oriented Programming and Java, including key OOP principles and Java basics

**CO2:** Use appropriate Java constructs such as classes, objects, to represent and manage data.

**CO3:** Write Java programs incorporating control structures, arrays, inheritance, and polymorphism to solve complex problems.

**CO4:** Handle exceptions and implement exception handling, and multithreading in Java to develop efficient and robust applications.

**CO5:** Perform file operations and implement networking using Java to create practical, real-world applications.

**TOTAL: 30 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                                                | 2   | 1   | 1   |     | 2   | -   | -   | -   | -   | 1    | -    | -    | 3    | -    | 2    |
| CO2                                                                                                                                | 2   | 1   | 1   | 1   | 2   | -   | -   | -   | -   | 1    | -    | -    | 3    | -    | 2    |
| CO3                                                                                                                                | 2   | 1   | 1   | 1   | 2   | -   | -   | -   | -   | 1    | -    | -    | 3    | -    | 2    |
| CO4                                                                                                                                | 2   | 1   | 1   | 1   | 2   | -   | -   | -   | -   | 1    | -    | -    | 3    | -    | 2    |
| CO5                                                                                                                                | 2   | 1   | 1   | 1   | 2   | -   | -   | -   | -   | 1    | -    | -    | 3    | -    | 2    |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY             | APPROVED BY                                |
|--------------------------------|--------------------------------------------|
| Prof. Dennis Ebenezer- AP/ CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department            | Name and Department of BoS Chairman        |

U23EE313

SDG:8&amp;17

APTITUDE &amp; COMMUNICATION FOR ENGINEERS - I

Category : EEC

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**COURSE OBJECTIVE:**

1. To create an awareness regarding the internal inhibitions that prevents the students from opening out in classrooms and other forums and there by overcoming the shyness to perform.
2. To make students understand the importance of English as a global language and train them for simple English communication through various speech craft activities and improve their communicative English for industry readiness.
3. To develop an awareness about making a conscious effort towards avoiding errors in daily communication.
4. To train students on clearing various placement papers with greater accuracy.

**UNIT 1 INTRODUCTION 3**

Introduction about the Course -Learning expectations - Communication pre-assessment

**UNIT 2 SPEAKING SKILLS -NOVICE 6**

Communication skills – Shy barrier - Importance of English - Challenges faced in English communication - Developing a globally comprehensible accent -Speech Craft- Public Speaking – Squabble.

**UNIT 3 SPEAKING SKILLS -INTERMEDIATE 6**

Speech Craft –for and against –Debate (Ship Wreck Activity)

**UNIT 4 LANGUAGE GYM - I 6**

Tenses for various communication scenarios – Common errors in daily communication – Thought Group reading – Passage writing.

**UNIT 5 APTITUDE FOR PLACEMENTS - I 9**

Placement Paper 1 – HCF & LCM, Problems on Numbers-Placement Paper 2 – Average, Simplification – Placement Paper 3-Percentage, Simple & compound Interest - Placement Paper 4 – Time & Distance – Placement Paper 5-Trains & Boats, Placement Paper 6 – Time & Work, Pipes & Cistern.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Students will be able to participate in any learning activity without any reservations. They shall be ready to move beyond their comfort zone to acquire new skills throughout their life.

**CO2:** Students shall understand and appreciate the importance of English in the current global scenario and make efforts towards up skilling the same.

**CO3:** Students shall be able to present their view and standpoints in any scenarios confidently.

**CO4:** Use the correct Grammar and Vocabulary, ensuring the enhancement their language skills and effective communication.

**CO5:** To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Dinesh Khattar. Pearson.
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication.
3. A Modern Approach to Verbal and Non-Verbal Reasoning R.s. Aggarwal.

**REFERENCES:**

1. Quantitative Aptitude for CAT, Arun Sharma.
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication.
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs, Sarvesh K. Verma.
4. Wiley's Exam Xpert Quantitative Ability for CAT, 2ed, Ashu Jain.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                              |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-----------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                               | 1   | -   | -   | -   | -   | -   | -   | 1   | -   | 3     | -     | -     | -     | -     | -     |
| CO2                                                                                                                               | 1   | -   | -   | -   | -   | -   | -   | 1   | -   | 3     | -     | -     | -     | -     | -     |
| CO3                                                                                                                               | 1   | -   | -   | -   | -   | -   | -   | 1   | -   | 3     | -     | -     | -     | -     | -     |
| CO4                                                                                                                               | 1   | -   | -   | -   | -   | -   | -   | 1   | -   | 3     | -     | -     | -     | -     | -     |
| CO5                                                                                                                               | 3   | -   | -   | -   | -   | -   | -   | 1   | 1   | -     | -     | -     | -     | -     | -     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“ no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| <b>COURSE DESIGNED BY</b>      | <b>APPROVED BY</b>                         |
|--------------------------------|--------------------------------------------|
| Prof. Ramesh Raja – Head/NCPIR | Dr.S.Pathur Nisha – Professor & Head / CSE |
| <b>Name and Department</b>     | <b>Name and Department of BoS Chairman</b> |

## SEMESTER IV

U23MA408

SDG: 9

# DISCRETE MATHEMATICS

**Category : BSC**

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. To Understand the basic concepts in sets and relations
2. To build problem solving skills by enhancing students logical and mathematical maturity
3. To acquire the knowledge of combinatorics
4. To familiarize the applications of algebraic structures.
5. To gain the knowledge of graph theory and to solve the practical problems.

## UNIT 1

## SET THEORY

9

Operations and Laws of Sets - Cartesian Product, Binary Relation - Equivalence Relation - Partial ordering – Poset – Hasse diagram. Application: Vehicle Model Catalogue

## UNIT 2

## LOGIC

9

Truth Tables, Tautology and Contradiction - Logical Equivalence: The Laws of Logic, Logical Implication, - Disjunctive and Conjunctive Normal Form. - Predicates and quantifiers. Rules of Inference. Application: Knowledge representation in artificial intelligence using Basic Connectives

## UNIT 3

# COMBINATORICS

9

Mathematical induction – Strong induction and well ordering – The basics of counting – Permutations and combinations – Solving linear recurrence relations – Inclusion and exclusion principle. Application : Pigeon hole principle

## UNIT 4

## ALGEBRAIC STRUCTURES

9

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Normal subgroup and cosets – Lagrange’s theorem. Application: Error detection and encoding functions

## UNIT 5

## GRAPH THEORY

9

Graphs and their Properties- Degree, Connectivity – Path – Cycle - Sub Graph, Isomorphism - Eulerian and Hamiltonian paths and circuits - Graph Coloring, Planar Graphs. Application: Map for Online Food Delivery System

**COURSE OUTCOMES:**

At the end of the course, students would

**C01:** Solve the problems using the concepts of sets, Truth Tables, counting techniques, properties of algebraic structures and graph network techniques to solve engineering problems.

**CO2:** Comprehend the concepts needed to test the relations, laws of logic, Strong induction, Groups and Properties of Graphs

**CO3:** Demonstrate the knowledge in functions, Logical Implication, Mathematical induction, Subgroups and Graph Coloring

**CO4:** Analyze the concepts and Poset, Normal Form , Permutations and combinations, Normal subgroup and Eulerian and Hamiltonian paths and circuits

**CO5:** Apply and Analyze Hasse diagram, Rules of Inference, linear recurrence relations, Lagrange's theorem and Matrices of Graph Isomorphism

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Rosen. K.H., "Discrete Mathematics and its Applications", 7<sup>th</sup> Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30<sup>th</sup> Reprint, 2011.
3. Venkatraman M.K, Sridharan. N and Chandrasekaran N. Discrete Mathematics, The National Publishing Company, Chennai, Fourth edition, 2014.

**REFERENCES:**

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5<sup>th</sup> Edition, Pearson Education Asia, Delhi, 2013.
2. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3<sup>rd</sup> Edition, 2010.
3. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
4. Kenneth. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill P.Co, New Delhi, Seventh Edition, 2014.
5. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt Ltd ,New Delhi, Sixth Edition, 2013.

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |      |      |      |      |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|------|------|------|------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1                                  | 3   | 3   | 3   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1    | -    | -    | -    |
| CO2                                  | 3   | 3   | 3   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1    | -    | -    | -    |
| CO3                                  | 3   | 3   | 3   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1    | -    | -    | -    |
| CO4                                  | 3   | 3   | 3   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1    | -    | -    | -    |
| CO5                                  | 3   | 3   | 3   | 1   | -   | -   | -   | -   | 1   | -     | -     | 1    | -    | -    | -    |

Correlation levels: 1 – low      2 – medium      3 – high      “-“- no correlation

| COURSE DESIGNED BY                         | APPROVED BY                                   |
|--------------------------------------------|-----------------------------------------------|
| Prof M. S. Uma Maheswari - AP/ Mathematics | Dr. K.Parimala Gandhi – Professor & Head/ S&H |
| Name and Department                        | Name and Department of BoS Chairman           |

U23CS401

SDG:4

DATABASE MANAGEMENT SYSTEMS

Category : PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. Understand the objective of a database management system
2. To facilitate the creation of data structures and SQL queries
3. To learn the basics of transaction processing
4. To gain knowledge on concurrency control techniques
5. To Understand database storage structures and access techniques

**UNIT 1****DBMS AN OVERVIEW****9**

Introduction Overview- Database System vs File System- Database System Concept and Architecture-Data Model Schema and Instances. Data Modeling Using the Entity Relationship Model: ER Model Concepts- Notation for ER Diagram- Introduction to relational databases.

**UNIT 2****SQL IN DBMS****9**

Introduction on SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL. Crystal Reports: Report generation and data visualization using SQL queries.

**UNIT 3****DATABASE DESIGNING****9**

Overview of the Design Process - Reducing E-R Diagrams to Relational Schemas - Decomposition Using Functional Dependencies - Normal Forms, first, second, third normal forms, Join Dependencies and Fifth Normal Form, BCNF, inclusion dependence, normalization using FD, MVD, and JDs, alternative approaches to database design.

**UNIT 4****TRANSACTION****9**

Transaction Processing Concept Transaction System, Testing of Serializability, Concurrency Control, Deadlock Handling, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints. OLTP and OLAP: Overview, comparison, and use cases.

## **UNIT 5                      IMPLEMENTATION & STORAGE                      9**

Distributed Database: Distributed Data Storage, Directory System. RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview.

### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Explain database concepts, architectures, data models, and ER modeling for relational database design.

**CO2:** Construct and execute SQL queries for data retrieval, manipulation, and report generation.

**CO3:** Apply normalization techniques to optimize database design and ensure data integrity.

**CO4:** Analyze transaction processing, concurrency control, recovery mechanisms, OLTP, and OLAP concepts.

**CO5:** Implement indexing, hashing, query processing, and distributed database storage techniques.

**TOTAL: 45 PERIODS**

### **TEXT BOOKS:**

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition (Unit 1,3,5)
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, VII edition. (Unit 2,4)

### **REFERENCES:**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition. (units 1, 3,5)
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education (units 1,3,4,5)
3. Introduction to Database Systems, C. J. Date, Pearson Education(units 1,3,4)
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.(units 3,5)
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI. (unit 2)
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition. (units 1, 3, 4)

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                            |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|-----------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                              | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                             | 3   | 2   | -   | 2   | -   | -   | -   | -   | -   | 1     | -     | -     | 2     | -     | 1     |
| CO2                                                                                                             | 3   | 3   | 2   | 3   | 2   | -   | -   | -   | -   | 1     | -     | 2     | 3     | 2     | 2     |
| CO3                                                                                                             | 3   | 2   | 3   | 3   | 2   | -   | -   | -   | -   | 2     | 1     | 2     | 3     | 2     | 3     |
| CO4                                                                                                             | 3   | 2   | 2   | 3   | 2   | 3   | 2   | 3   | 2   | 3     | 2     | 2     | 3     | 2     | 2     |
| CO5                                                                                                             | 2   | 3   | 3   | 3   | 3   | 2   | -   | 2   | -   | 3     | 3     | 3     | 2     | 3     | 3     |
| Correlation levels:      1 – low              2 – medium              3 – high              “-”- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY                | APPROVED BY                                |
|-----------------------------------|--------------------------------------------|
| Prof. S. Karpaga Iswarya- AP/ CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department               | Name and Department of BoS Chairman        |

U23CS402

SDG:4

**INTRODUCTION TO OPERATING SYSTEM**

Category : PCC

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| 3        | 0        | 0        | 3        |

**COURSE OBJECTIVE:**

1. To understand the basics and functions of operating systems.
2. To understand threads and processes.
3. To understand concept of deadlocks and to analyze
4. To analyze the memory management strategies.
5. To be familiar with memory management and file systems.
6. To know the security concepts.

**UNIT 1****BASICS OF OPERATING SYSTEM****9**

Operating System Overview: Objective and Functions, Evolution of Operating System, Services, Interface, Structure and Operations-System Calls – Types of System Calls – System Programs. Process life cycle, Process Scheduling – Operations on Processes – Inter-process Communication.

**UNIT 2                      MULTITHREADING AND PROCESS MANAGEMENT                      9**

Overview of Threads- Multithreading models, Thread Libraries, Threading issues, Synchronization – The critical-section problem, Peterson’s Solution, Synchronization hardware, Mutex locks, Semaphores, Classical problems of synchronization.

**UNIT 3                      DEADLOCK AND MEMORY MANAGEMENT                      9**

Overview of Deadlock - Deadlock prevention, Deadlock avoidance , Deadlock Detection, Recovery from Deadlock. Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table Segmentation.

**UNIT 4                      STORAGE MANAGEMENT                      9**

Memory management-segmentation. File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management.

**UNIT 5                      MOBILE OS AND SECURITY                      9**

Mobile OS - iOS and Android-Architecture and SDK framework., Security, Security Threats, Protection Mechanism, Authentication.

***COURSE OUTCOMES:***

At the end of the course, students would

**CO1:** Understand the concepts of operating systems.

**CO2:** Compare and analyze various scheduling algorithms and Process Synchronization.

**CO3:** Understand Deadlock Prevention and Avoidance Algorithms.

**CO4:** Compare and contrast various memory management strategies and functionality of file systems.

**CO5:** Compare iOS and Android operating systems with security mechanism.

**TOTAL: 45 PERIODS**

***TEXT BOOKS:***

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”l, 10th Edition, John Wiley and Sons Inc., 2018.

2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi.

***REFERENCES:***

1. Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.

2. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.

3. Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                        |     |     |     |     |     |     |     |     |     |       |       |       |       |      |      |
|-----------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|------|------|
| CO                                                                                                                          | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO2 | PSO3 |
| CO1                                                                                                                         | 3   | 1   | 2   | 2   | -   | -   | -   | -   | 3   | 1     | 2     | 1     | 2     | 1    | 2    |
| CO2                                                                                                                         | 2   | 2   | 3   | 1   | -   | -   | -   | -   | 2   | 1     | 1     | 2     | 2     | 2    | 2    |
| CO3                                                                                                                         | 1   | 3   | 2   | 2   | -   | -   | -   | -   | 2   | 2     | 1     | 1     | 2     | 1    | 2    |
| CO4                                                                                                                         | 1   | 3   | 3   | 3   | -   | -   | -   | -   | 1   | 2     | 1     | 3     | 2     | 3    | 1    |
| CO5                                                                                                                         | 3   | 1   | 3   | 1   | -   | -   | -   | -   | 3   | 2     | 3     | 3     | 2     | 2    | 2    |
| Correlation levels:      1 – low                  2 – medium                  3 – high                  “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |      |      |

| COURSE DESIGNED BY              | APPROVED BY                                |
|---------------------------------|--------------------------------------------|
| Prof. K. Arun Patrick - AP/ CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department             | Name and Department of BoS Chairman        |

**U23CS403**

**SDG:4**

**INTERNET OF THINGS**

**Category : PCC**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**COURSE OBJECTIVE:**

1. To learn the basics of IoT.
2. To understand how to design IoT systems
3. To use Python and Raspberry Pi for IoT
4. To build IoT projects.
5. To solve real-world problems with IoT.

**UNIT 1**

**FUNCTIONAL BLOCKS OF IoT**

**9**

Definition and Characteristics of IoT – Physical Design: Layers and Protocols – Logical Design: IoT Functional Blocks – IoT Communication models and APIs – IoT Enabling Technologies – IoT Levels and Deployment Templates.

## UNIT 2                      IoT DESIGN METHODOLOGY                      9

M2M – M2M Vs IoT – Software Defined Networks – Network function Virtualization – IoT Platform Design Methodologies – Domain Specific IoT.

**UNIT 3      PYTHON PACKAGES FOR IOT AND RASPBERRY PI      9**

JSON – XML – HTTPLib and URLLib – SMTPLib. Raspberry Pi : Pin Configurations – Interfaces : Serial, SPI, 12C Programming – Python program with Raspberry Pi– Controlling Output – Reading input from pins.

UNIT 4                      **IoT APPLICATIONS USING RASPBERRY PI**                      **9**

LED Controlling – Traffic Light controller – Integrating Sensors – Developing web application to control IoT device – Uploading the sensor values onto the cloud for analysis – Sending SMS – Sending images and video via mail.

|               |                      |          |
|---------------|----------------------|----------|
| <b>UNIT 5</b> | <b>IoT USE CASES</b> | <b>9</b> |
|---------------|----------------------|----------|

Smart and Connected Cities – An IoT Strategy for Smarter Cities – Architecture – Use Cases: Street Lighting – Smart Parking – Smart Traffic – Smart Home Automation – Smart Agriculture – Weather Monitoring.

**COURSE OUTCOMES:**

At the end of the course, students would

## CO1: Recall IoT basics, layers and technologies

**CO2:** Understand IoT design and applications.

### C03: Use Python and Raspberry Pi for IoT.

## CO4: Build IoT projects with Raspberry Pi.

**CO5:** Analyze IoT solutions for real-world problems.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. ArshdeepBahga and Vijay Madiseti, Internet of Things –A Hands-on Approach, Orient Blackswan Private Limited, New Delhi, First Edition, 2015.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Pearson Education, First Edition, 2017.

**REFERENCES:**

1. Francis daCosta, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications, New York, First Edition, 2013.
2. Rajkamal, Internet of Things: Architecture, Design Principles And Applications, McGraw Hill Education, New York, First Edition, 2017.
3. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things – Key Applications and Protocols, Wiley, New York, 2015.
4. [https://onlinecourses.nptel.ac.in/noc22\\_cs53/preview](https://onlinecourses.nptel.ac.in/noc22_cs53/preview)

**CO's-PO's & PSO's MAPPING**

| CO                                                                                                                           | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1                                                                                                                          | 3   | 1   | 1   | -   | 1   | -   | -   | -   | -   | -    | -    | 2    | -    | -    | -    |
| CO2                                                                                                                          | 3   | 1   | 1   | -   | 1   | -   | -   | -   | -   | -    | -    | 2    | -    | -    | -    |
| CO3                                                                                                                          | 3   | 1   | 3   | -   | 2   | -   | -   | -   | -   | -    | -    | 2    | 2    | 2    | 2    |
| CO4                                                                                                                          | 3   | 1   | 3   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 2    | 2    | 2    |
| CO5                                                                                                                          | 3   | 3   | 3   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 2    | -    | 2    |
| Correlation levels:      1 – low                  2 – medium                  3 – high                  “-” - no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY            | APPROVED BY                                  |
|-------------------------------|----------------------------------------------|
| Prof. V.Satheeswaran - AP/ECE | Dr. S. Pathur Nisha – Professor & Head / CSE |
| Name and Department           | Name and Department of BoS Chairman          |

**U23CS404**  
**SDG:4**

**THEORY OF COMPUTATION****Category : PCC**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**COURSE OBJECTIVE:**

1. To understand the foundations of computation including automata theory
2. To construct models of regular expressions and languages.
3. To design context-free grammar and push down automata
4. To understand Turing machines and their capability
5. To understand Undecidability and NP class problems

**UNIT 1                  AUTOMATA AND REGULAR EXPRESSIONS****9+3**

Introduction to formal proof – Basic Mathematical Notation and techniques- Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without  $\epsilon$ -moves- Conversion of NFA into DFA –

Minimization of DFAs.

**UNIT 2                    REGULAR EXPRESSIONS (RE) AND LANGUAGES                    9+3**

Regular expression – Regular Languages- Equivalence of NFA and regular expressions –Direct method for Conversion: Regular Expressions to FA, Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.

**UNIT 3                    CONTEXT-FREE GRAMMAR AND PUSH DOWN                    9+3**  
**AUTOMATA**

Introduction of Grammar- Types of Grammar -Context-Free Grammar (CFG) – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG, CFG to PDA, PDA to CFG – Deterministic Pushdown Automata.

**UNIT 4                    NORMAL FORMS AND TURING MACHINES                    9+3**

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages –Turing Machines: Definitions – Models – Programming Techniques for TM.

**UNIT 5                    UNDECIDABILITY                    9+3**

A language that is not Recursively Enumerable – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – Intractable problems: The classes P and NP: The class of languages P – The class of languages NP – Travelling Salesman's Problem.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Design and develop various finite-state machines

**CO2:** Analyze the properties of different languages.

**CO3:** Demonstrate the push-down automata model for a given language.

**CO4:** Understand and design the various types of Turing machine

**CO5:** Differentiate between decidable and undecidable problems

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Pearson Education, Third Edition, 2011.
2. J.E.Hopcroft, R.Motwani and J.D Ullman, —Introduction to Automata Theory, Languages and Computations, Second Edition, Pearson Education, 2003.

**REFERENCES:**

1. Micheal Sipser, —Introduction of the Theory and Computation, Thomson Brokecole, 1997.
2. K V N Sunitha, N Kalyani: Formal Languages and Automata Theory, Tata McGraw Hill, New Delhi, 2010.
3. A A Puntebkar – Theory of Computation, Technical Publication, India

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                             |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                               | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                              | 1   | 3   | 2   | 3   | -   | -   | -   | -   | 1   | 1     | 2     | 3     | 1     | 3     | 2     |
| CO2                                                                                                              | 2   | 2   | 3   | 2   | 1   | -   | -   | -   | 3   | 3     |       | 3     | 2     | 2     | 3     |
| CO3                                                                                                              | 2   | 2   | 3   | 2   | 1   | -   | -   | -   | 1   | 3     |       | 2     | 2     | 2     | 3     |
| CO4                                                                                                              | 2   | 2   | 2   | 1   | -   | -   | -   | -   | 1   | 3     |       | 2     | 2     | 2     | 2     |
| CO5                                                                                                              | 2   | 2   | 2   | 1   | 1   | -   | -   | -   | 1   | 1     |       | 2     | 2     | 2     | 2     |
| Correlation levels:      1 – low              2 – medium              3 – high              “-“ - no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY    | APPROVED BY                                |
|-----------------------|--------------------------------------------|
| Prof. P.Aruna- AP/CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department   | Name and Department of BoS Chairman        |

U23CS405

SDG:4

OBJECT ORIENTED SOFTWARE ENGINEERING

Category : PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 2 | 4 |

**COURSE OBJECTIVE:**

1. To understand Software Engineering Lifecycle Models
2. To Perform software requirements analysis
3. To gain knowledge of the System Analysis and Design concepts using UML
4. To understand software testing and maintenance approaches
5. To work on project management scheduling using DevOps

**UNIT 1****SOFTWARE PROCESS AND AGILE DEVELOPMENT**

9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile Process-Extreme programming.

## **UNIT 2                      REQUIREMENTS ANALYSIS AND OBJECT MODELLING                      9**

Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification –Data Dictionary- Petrinets – Object modeling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram- CASE TOOLS.

## **UNIT 3                      SOFTWARE DESIGN AND PATTERNS                      9**

Software design – Design process – Design concepts – Coupling – Cohesion – Design patterns – Model-view-controller – Publish-subscribe – Adapter – Command – Strategy – Observer – Architectural styles – Layered - Client Server - Tiered - Pipe and filter-Case study.

## **UNIT 4                      SOFTWARE TESTING AND MAINTENANCE                      9**

Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking-Case Study.

## **UNIT 5                      PROJECT MANAGEMENT                      9**

Software Project Management- Software Configuration Management - Project Scheduling - Software Estimation - DevOps: Motivation-Cloud as a platform-Operations- Deployment -Case Study

**THEROY : 45 PERIODS**

### **LIST OF EXPERIMENTS:**

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the usecase diagram
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios.

### **SUGGESTED DOMAINS FOR MINI-PROJECT:**

1. Passport automation system.
2. Book bank

3. Exam registration
4. Stock maintenance system.
5. Online course reservation system
6. Airline/Railway reservation system
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference management system
13. BPO management system
14. Library management system
15. Student information system

**LAB: 30 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** To Understand and Compare various Software Development Lifecycle Models.

**CO2:** Perform Software Requirement Analysis and gain knowledge of the system analysis and design using UML

**CO3:** Architect and design using architectural styles and design patterns, and test the system.

**CO4:** To Apply software testing and maintenance approaches.

**CO5:** Evaluate Project management approaches, estimation strategies and to work on project management scheduling using DevOps.

**TOTAL: 75 PERIODS**

**TEXT BOOKS:**

1. Bernd Bruegge and Allen H. Dutoit, “Object-Oriented Software Engineering: Using UML, Patterns and Java”, Third Edition, Pearson Education, 2009
2. Roger S. Pressman, Object-Oriented Software Engineering: An Agile Unified Methodology, First Edition, Mc Graw-Hill International Edition, 2014.

**REFERENCES:**

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Len Bass, Ingo Weber and Liming Zhu, “DevOps: A Software Architect’s Perspective”, Pearson Education, 2016
4. Rajib Mall, Fundamentals of Software Engineering, 3rd edition, PHI Learning Pvt. Ltd., 2009.
5. Stephen Schach, Object-Oriented and Classical Software Engineering, 8th ed, McGraw-Hill, 2010.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                | 3   | 2   | 1   | 2   | 2   | -   | -   | -   | -   | 1     | 2     | 1     | 2     | 1     | 2     |
| CO2                                                                                                                                | 2   | 2   | 3   | 3   | 2   | -   | -   | -   | 2   | 1     | 3     | 2     | 2     | 2     | 2     |
| CO3                                                                                                                                | 2   | 3   | 2   | 1   | 1   | -   | -   | -   | 2   | 2     | 3     | 1     | 2     | 3     | 2     |
| CO4                                                                                                                                | 2   | 3   | 1   | 2   | 3   | -   | -   | -   | 2   | -     | 2     | 3     | 2     | 3     | 1     |
| CO5                                                                                                                                | 2   | 1   | 1   | 1   | 2   | -   | -   | -   | -   | 2     | 3     | 3     | 2     | 2     | 2     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY       | APPROVED BY                                |
|--------------------------|--------------------------------------------|
| Prof. L. Nithya - AP/CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department      | Name and Department of BoS Chairman        |

U23CS411  
SDG: 4

### DATABASE MANAGEMENT SYSTEM LABORATORY

Category: PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 2 | 1 |

#### COURSE OBJECTIVE:

1. To describe the basics of SQL and construct queries using SQL.
2. To demonstrate the use of constraints and relational algebra operations.
3. To facilitate students in Database design.
4. To familiarize issues of concurrency control and transaction management.

#### LIST OF EXPERIMENTS:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Write a SQL statement for implementing ALTER, UPDATE and DELETE
3. Write the query for implementing the following functions: MAX(), MIN(), AVG(), COUNT()
4. Practicing DDL commands
5. Practicing DML commands

6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Write the queries to implement the joins
8. Usage of Cursors
9. Write the query for creating the users and their role.
10. Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints

**COURSE OUTCOME :**

At the end of the course, students would

- CO1:** Explain database concepts, architectures, data models, and ER modeling for relational database design.
- CO2:** Construct and execute SQL queries for data retrieval, manipulation, and report generation.
- CO3:** Apply normalization techniques to optimize database design and ensure data integrity.
- CO4:** Analyse transaction processing, concurrency control, recovery mechanisms, OLTP, and OLAP concepts.
- CO5:** Implement indexing, hashing, query processing, and distributed database storage techniques.

**TOTAL: 30 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |
|-------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|------|
| CO                                                                                  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1                                                                                 | 3   | 3   | 2   | 2   | 2   | -   | -   | -   | 1   | 1     | -     | 2     | 3     | 2     | 2    |
| CO2                                                                                 | 3   | 3   | 3   | 2   | 3   | -   | -   | -   | 2   | 2     | -     | 2     | 3     | 2     | 3    |
| CO3                                                                                 | 3   | 2   | 3   | 3   | 3   | 2   | -   | 2   | 2   | 2     | 1     | 3     | 3     | 3     | 3    |
| CO4                                                                                 | 3   | 2   | 2   | 3   | 2   | 3   | 2   | 3   | 2   | 3     | 2     | 2     | 3     | 2     | 2    |
| CO5                                                                                 | 2   | 3   | 3   | 3   | 3   | 2   | -   | 2   | -   | 3     | 3     | 3     | 2     | 3     | 3    |
| Correlation levels: 1 – low      2 – medium      3 – high      “-“ - no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |      |

| COURSE DESIGNED BY             | APPROVED BY                                |
|--------------------------------|--------------------------------------------|
| Prof. Dennis Ebenezer- AP/ CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department            | Name and Department of BoS Chairman        |

**U23CS412 INTRODUCTION TO OPERATING SYSTEMS**  
**SDG:4 & 8 LABORATORY**

**Category : PCC**

| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|----------|----------|----------|----------|
| <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> |

**COURSE OBJECTIVE:**

1. To install and configure Windows operating systems.
2. To understand the basics of Unix commands and shell programming.
3. To implement various CPU scheduling algorithms, page replacement algorithms, and memory allocation methods.
4. To implement Deadlock Avoidance and Deadlock Detection algorithms.
5. To be familiar with file organization and file allocation strategies.

**LIST OF EXPERIMENTS:**

1. Installation of windows operating system.
2. Illustrate UNIX commands and Shell Programming.
3. Process Management using System Calls : Fork, Exit, Getpid, Wait, Close.
4. Write C programs to implement the various CPU Scheduling Algorithms.
5. Illustrate the inter process communication strategy.
6. Implement mutual exclusion by Semaphore.
7. Write C programs to avoid Deadlock using Banker's Algorithm.
8. Write a C program to Implement Deadlock Detection Algorithm.
9. Write C program to implement Threading.
10. Implement the paging Technique using C program.
11. Write C programs to implement the various Page Replacement Algorithms.
12. Write C programs to implement the various File Organization Techniques.
13. Write C programs for the implementation of various disk scheduling algorithms.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Define and implement UNIX Commands.

**CO2:** Compare the performance of various CPU Scheduling Algorithms.

**CO3:** Compare and contrast various Memory Allocation Methods.

**CO4:** Define File Organization and File Allocation Strategies.

**CO5:** Implement various Disk Scheduling Algorithms  
**CO1:** Define and implement UNIX commands, file organization, and file allocation strategies.



|                                                                                                                                                                                                                             |                                     |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------|
| <b>UNIT 1</b>                                                                                                                                                                                                               | <b>INTRODUCTION</b>                 | <b>2</b>  |
| Introduction about the Course - Learning expectations.                                                                                                                                                                      |                                     |           |
| <b>UNIT 2</b>                                                                                                                                                                                                               | <b>SPEAKING SKILLS -VANTAGE</b>     | <b>12</b> |
| Speech Craft –My buddy – Impromptu.                                                                                                                                                                                         |                                     |           |
| <b>UNIT 3</b>                                                                                                                                                                                                               | <b>PERSONALITY DEVELOPMENT</b>      | <b>3</b>  |
| Psychometric Assessments - SWOT analysis.                                                                                                                                                                                   |                                     |           |
| <b>UNIT 4</b>                                                                                                                                                                                                               | <b>PLACEMENT READINESS</b>          | <b>4</b>  |
| Placement inventory— Resume – Grooming.                                                                                                                                                                                     |                                     |           |
| <b>UNIT 5</b>                                                                                                                                                                                                               | <b>APTITUDE FOR PLACEMENTS - II</b> | <b>9</b>  |
| Placement Paper 7–Permutation & Combination – Probability, Placement Paper 8 – Arithmetic Reasoning – Problems on Ages, Placement Paper 9 – Ratio Proportion & Alligation Mixture, Placement Paper 10 – Clocks & Calendars. |                                     |           |

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Students will be able to participate in any learning activity without any reservations. They shall be ready to move beyond their comfort zone to acquire new skills throughout their life.

**CO2:** Students shall understand and appreciate the importance of English in the current global scenario and make efforts towards up skilling the same.

**CO3:** They must be able to identify their strength and enhance the same.

**CO4:** They shall prepare themselves to kick start their career by taking a stock of their existing skills and plan to acquire new skills required to achieve their goals.

**CO5:** They shall demonstrate a good understanding of basic mathematical concepts required to learn engineering. To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes

**TOTAL: 30 PERIODS**

**TEXT BOOKS:**

1. The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Dinesh Khattar. Pearson
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication
3. A modern Approach to Verbal and Non-Verbal Reasoning R.S. Aggarwal
4. A Modern Approach to Verbal & Non-Verbal Reasoning - Aggarwal R. S

**REFERENCES:**

1. Quantitative Aptitude for CAT, Arun Sharma.
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication.
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs, Sarvesh K. Verma.

4. Wiley's Exam Xpert Quantitative Ability for CAT, 2ed, Ashu Jain.

**CO's-PO's & PSO's MAPPING**

| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1                                                                                                                                | 1   | -   | -   | -   | -   | -   | -   | 2   | -   | 3    | -    | 3    | -    | -    | -    |
| CO2                                                                                                                                | -   | -   | -   | -   | -   | 2   | 2   | 1   | -   | 3    | -    | -    | -    | -    | -    |
| CO3                                                                                                                                | 3   | 3   | 3   | 3   | -   | -   | -   | -   | -   | 1    | -    | -    | -    | -    | -    |
| CO4                                                                                                                                | 3   | 2   | 1   | 3   | -   | -   | -   | -   | -   | 1    | -    | -    | -    | -    | -    |
| CO5                                                                                                                                | 1   | 1   | 1   | 1   | -   | -   | -   | -   | -   | 3    | -    | -    | -    | -    | -    |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY             | APPROVED BY                                |
|--------------------------------|--------------------------------------------|
| Prof. Ramesh Raja – Head/NCPIR | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department            | Name and Department of BoS Chairman        |

## SEMESTER V

U23CS501

SDG:4

ARTIFICIAL INTELLIGENCE AND  
MACHINE LEARNING

Category: PCC

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**COURSE OBJECTIVE:**

1. To learn the key benefits and risks associated with AI.
2. To learn the search and game-based decision strategies.
3. To understand classification vs regression and different ML learning approaches.
4. To learn classification models.
5. To learn classification and clustering techniques.

**UNIT 1 INTRODUCTION TO AI AND UNINFORMED SEARCH 9**

Introduction – Foundations of AI – History of AI – The state of the art – Risks and Benefits of AI -Intelligent Agents – Nature of Environment – Structure of Agent – Problem Solving Agents -Formulating Problems – Uninformed Search – Breadth First Search – Dijkstra's algorithm or uninformed cost search – Depth First Search – Depth Limited Search.

**UNIT 2 SEARCH TECHNIQUES 9**

Informed Search – Greedy Best First – A\* algorithm – Adversarial Game and Search – Game theory – Optimal decisions in game – Min Max Search algorithm – Alpha-beta pruning – Constraint Satisfaction Problems (CSP) – Examples – Map Coloring – Job Scheduling – Backtracking Search for CSP.

**UNIT 3 MACHINE LEARNING 9**

Machine Learning: Definitions – Classification – Regression – approaches of machine learning models – Types of learning – Probability – Basics – Linear Algebra – Hypothesis space and inductive bias, Evaluation- Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance – Regression: Linear Regression – Logistic Regression.

**UNIT 4 SUPERVISED LEARNING 9**

Neural Network: Introduction, Perceptron Networks – Adaline – Back propagation networks -Decision Tree: Entropy – Information gain – Gini Impurity – classification algorithm – Rule based Classification – Naive Bayesian classification – Support Vector Machines (SVM).

**UNIT 5 UNSUPERVISED LEARNING 9**

Unsupervised Learning – Principle Component Analysis – Neural Network: Fixed Weight Competitive Nets – Kohonen Self-Organizing Feature Maps – Clustering: Definition – Types of Clustering – Hierarchical clustering algorithms – k-means algorithm.

**THEORY : 45 PERIODS**  
**TUTORIAL : 15 PERIODS**

1. Implement and compare Greedy and A\* algorithms.
2. Build an artificial neural network by implementing the back propagation algorithm and test the same using appropriate data sets.
3. Write a program to implement the naive Bayesian classifier.
4. Implementing neural network using self-organizing maps.
5. Implementing k-Means algorithm to cluster a set of data.

**TOTAL : 60 PERIODS**

**COURSE OUTCOMES:**

At the end of the course , students would able to

**CO1:** List the key benefits and risks associated with AI

**CO2:** Describe informed search and game-based decision strategies

**CO3:** Interpret classification vs regression and different ML learning approaches.

**CO4:** Construct and evaluate classification models

**CO5:** Evaluate the suitability of classification and clustering techniques.

**TEXT BOOKS:**

1. Deisenroth, Faisal, Ong, Mathematics for Machine Learning, Cambridge University Press, 2020.
2. B Joshi, Machine Learning and Artificial Intelligence, Springer, 2020.

**REFERENCES:**

1. Solanki, Kumar, Nayyar, Emerging Trends and Applications of Machine Learning, IGI Global, 2018.
2. Mohri, Rostamizdeh, Talwalkar, Foundations of Machine Learning, MIT Press, 2018.
3. Kumar, Zindani, Davim, Artificial Intelligence in Mechanical and Industrial Engineering, CRC Press, 2021.
4. Zsolt Nagy - Artificial Intelligence and Machine Learning Fundamentals-Apress (2018)
5. Artificial Intelligence by Elaine Rich, Kevin Knight and Nair, TMH

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                                |            |            |            |            |            |            |            |            |            |              |              |              |             |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>CO</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>PO 10</b> | <b>PO 11</b> | <b>PO 12</b> | <b>PSO1</b> | <b>PSO2</b> | <b>PSO3</b> |
| <b>CO1</b>                                                                                                                          | 3          | 2          | 3          | 3          | -          | -          | -          | -          | 1          | 2            | 2            | 2            | 1           | 2           | 1           |
| <b>CO2</b>                                                                                                                          | 1          | 1          | 1          | 3          | -          | -          | -          | -          | 1          | 2            | 1            | 3            | 1           | 1           | 2           |
| <b>CO3</b>                                                                                                                          | 2          | 1          | 2          | 1          | -          | -          | -          | -          | 2          | 1            | 1            | 2            | 1           | 1           | 1           |
| <b>CO4</b>                                                                                                                          | 3          | 1          | 3          | 1          | -          | -          | -          | -          | 2          | 1            | 2            | 1            | 2           | 1           | 2           |
| <b>CO5</b>                                                                                                                          | 3          | 1          | 2          | 2          | -          | -          | -          | -          | 1          | 2            | 1            | 2            | 1           | 2           | 2           |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“ - no correlation |            |            |            |            |            |            |            |            |            |              |              |              |             |             |             |

| COURSE DESIGNED BY           | APPROVED BY                         |
|------------------------------|-------------------------------------|
| Mrs.R.Evance Leethial/AP/CSE | Dr S Pathur Nisha , Prof & Dean/CSE |
| Name and Department          | Name and Department of BoS Chairman |

U23CS502  
SDG:4

### COMPUTER NETWORKS

Category: PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 0 | 3 |

#### COURSE OBJECTIVE:

1. To understand the data communication system and the purpose of layered architecture.
2. To Understand the basics of data flows from one node to another in data link layer.
3. To study the functions of network layer and the various routing protocols.
4. To familiarize the functions and protocols of the Transport layer.
5. To learn different protocols used in the application layer.

#### UNIT 1 DATA COMMUNICATION AND PHYSICAL LAYERS 9

Introduction to Network - Data Communication - Networks – Network Types – The OSI Model— TCP/IP Protocol Suite – Addressing – Transmission Media.

#### UNIT 2 DATA LINK LAYER 9

Data link layer - Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Wireless LAN: Ethernet — Wireless LANs.

#### UNIT 3 NETWORK LAYER 9

Switching : Circuit Switching – Packet Switching – Internetworking - IPv6 – Routing Techniques: Distance vector (RIP) – Link state (OSPF) — Interdomain Routing (BGP) - ARP, RARP, ICMP, DHCP.

#### UNIT 4 TRANSPORT LAYER 9

UDP – TCP – TCP Connection Management - Congestion Control and Resource Allocation: TCP Congestion Control – Congestion Avoidance Mechanisms – Quality of Service - SCTP

#### UNIT 5 APPLICATION LAYER 9

Domain Name System – Electronic Mail (SMTP, MIME, IMAP, POP3) – File Transfer (FTP) – WWW (HTTP) – Network Management (SNMP).

#### COURSE OUTCOMES:

At the end of the course, students would

**CO1:** Outline the basic layers and its functions in computer networks.

**CO2:** Visualize the end-to-end flow of information in the data link layer protocols

**CO3:** Analyze routing algorithms and protocols for various functions in the network.

**CO4:** Summarize the different functions of transport layer protocols.

**CO5:** Apply the working of various application layer protocols in networks.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Eighth Edition, Pearson Education, 2021.
2. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022.

**REFERENCES:**

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012.

**CO's-PO's & PSO's MAPPING**

| CO                                                                                                                          | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1                                                                                                                         | 2   | 1   | 1   | -   | -   | -   | -   | -   | -   | 1    | 1    | 3    | 1    | 1    | -    |
| CO2                                                                                                                         | 3   | 1   | 1   | -   | -   | -   | -   | -   | -   | 1    | 1    | 3    | 1    | 1    | -    |
| CO3                                                                                                                         | 3   | 1   | -   | -   | -   | -   | -   | -   | -   | 1    | 1    | 2    | 1    | 1    | -    |
| CO4                                                                                                                         | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | 1    | 1    | 2    | 1    | 1    | -    |
| CO5                                                                                                                         | 2   | 1   | 1   | -   | -   | -   | -   | -   | -   | 1    | 1    | 2    | 1    | 1    | -    |
| Correlation levels:      1 – low                  2 – medium                  3 – high                  “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

| COURSE DESIGNED BY                                       | APPROVED BY                                |
|----------------------------------------------------------|--------------------------------------------|
| Dr Beulah David - ASP/CSE<br>Prof. L.Nithya – AP(SG)/CSE | Dr.S.Pathur Nisha – Professor & Dean / CSE |
| Name and Department                                      | Name and Department of BoS Chairman        |

U23CS503  
SDG:4

WEB DESIGN

Category : PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 2 | 4 |

**COURSE OBJECTIVE:**

1. To introduce the fundamentals of Internet, and the principles of web design.
2. To construct basic websites using HTML and Cascading Style Sheets.
3. To build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
4. To develop modern interactive web applications using PHP, XML and MySQL.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|
| <b>UNIT 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>INTRODUCTION</b>  | <b>9</b> |
| Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of latest version of Web.                                                                                                                                                                                                                                                                                                                                                                                                                                 |                      |          |
| <b>UNIT 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>HTML</b>          | <b>9</b> |
| Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of latest version of HTML. <b>Style sheets:</b> Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of of latest version of CSS. |                      |          |
| <b>UNIT 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>JAVA SCRIPT</b>   | <b>9</b> |
| Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: Java script and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML: Combining HTML, CSS and Java script, Events and buttons.                                                                                                                                                                                                                                 |                      |          |
| <b>UNIT 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>XML</b>           | <b>9</b> |
| Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT.                                                                                                                                                                                                                                                                                                                                                                                                                    |                      |          |
| <b>UNIT 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>PHP AND MYSQL</b> | <b>9</b> |
| Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs.                                                                                                                                                                                                                                                                                       |                      |          |

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Describe the concepts of World Wide Web, and the requirements of effective web design.

**CO2:** Develop web pages using the HTML and CSS features with different layouts as per need of applications.

**CO3:** Use the JavaScript to develop the dynamic web pages.

**CO4:** Construct simple web pages in PHP and to represent data in XML format.

**CO5:** Use server-side scripting with PHP to generate the web pages dynamically using the database connectivity.

**TOTAL: 45 PERIODS**

**PRACTICAL EXERCISES:**

1. Design and develop an event registration form.
2. Develop a sticky Navbar.
3. Develop a developer portfolio page.
4. Develop pricing card list using CSS and Flexbox.
5. Develop a register form using CSS and validate using java script and display error message.
6. To develop a website that uses json placeholder.
7. Develop a php server that creates, Reads, updates and deletes.
8. Develop a registration form that authenticates user sessions using PHP and MySQL.
9. Write a PHP program for the below mentioned task. Write a program using PHP and HTML to create a form and display the details entered by the user a. Write a program to store the username in a cookie and check whether the user has successfully logged in or not. b. Write a PHP Program to display current Date, Time and Day.

**SUGGESTED DOMAINS FOR MINI-PROJECT:**

1. Passport automation system.
2. Book bank .
3. Exam registration.

**LAB HOUR: 30 PERIODS****COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** To write HTML program to design responsive web pages

**CO2:** To apply CSS for design the web pages to improve the appealing of the content

**CO3:** To integrate Javascript to validate the form input in web application

**CO4:** To design a web application for different context and deploy

**TOTAL: 75 PERIODS****TEXT BOOKS:**

1. Simone Alessandria, Flutter Projects: A practical project-based guide to building real-world cross-platform mobile applications and games, Packt publishing.
2. Carmine Zaccagnino, Programming Flutter: Native, Cross-Platform Apps the Easy Way (The Pragmatic Programmers), Packt publishing.

**REFERENCES:**

1. Gergely Orosz, Building Mobile Applications at Scale:39 Engineering Challenges
2. Souvik Biswas & Codemagic, Flutter Libraries we love
3. ED Freitas, Daniel Jebaraj, Flutter Succinctly
4. Antonio Leiva, Kotlin for Android Developers Learn Kotlin the easy way while developing an Android Applications.

**CO's-PO's & PSO's MAPPING**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
|    |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |

|                                                                                                                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1                                                                                                                         | 3 | 1 | 2 | 2 | - | - | - | - | 3 | 1 | 2 | 1 | 2 | 1 | 2 |
| CO2                                                                                                                         | 2 | 2 | 3 | 1 | - | - | - | - | 2 | 1 | 1 | 2 | 2 | 2 | 2 |
| CO3                                                                                                                         | 1 | 3 | 2 | 2 | - | - | - | - | 2 | 2 | 1 | 1 | 2 | 1 | 2 |
| CO4                                                                                                                         | 1 | 2 | 2 | 2 | - | - | - | - | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| CO5                                                                                                                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Correlation levels:      1 – low                  2 – medium                  3 – high                  “-“- no correlation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| COURSE DESIGNED BY              | APPROVED BY                                |
|---------------------------------|--------------------------------------------|
| Prof. K. Arun Patrick - AP/ CSE | Dr.S.Pathur Nisha – Professor & Dean / CSE |
| Name and Department             | Name and Department of BoS Chairman        |

U23CS511  
SDG:4 & 8

### COMPUTER NETWORKS LABORATORY

Category : PCC

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 2 | 1 |

#### COURSE OBJECTIVE:

1. To learn various commands in computer networks.
2. To picture the simulation of TCP sockets, DNS using UDP sockets.
3. To envision network simulator of Congestion Control Algorithms using NS, ARP /RARP protocols.
4. To study TCP/UDP performance, Distance Vector/ Link State Routing algorithm. using Simulation tool.
5. To check error correction code using simulator.

#### LIST OF EXPERIMENTS

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like: a) Echo client and echo server b) Chat
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Simulation of an error correction code (like CRC)

#### COURSE OUTCOMES:

At the end of the course, students would

**CO1:** Implement the various commands, trace route PDU's.

**CO2:** Visualize and apply simulation of TCP sockets, DNS using UDP sockets.

**CO3:** Implement network simulator of Congestion Control Algorithms using NS, ARP /RARP protocols.

**CO4:** Apply and analyze the TCP/UDP performance, Distance Vector/ Link State Routing algorithm using Simulation tool.

**CO5:** Identify the error correction code using simulator.

**TOTAL: 30 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |       |       |       |      |      |      |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|------|------|------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                                                | 1   | -   | -   | -   | -   | -   | -   | -   | 1   | 1     | 1     | 1     | 1    | 1    | -    |
| CO2                                                                                                                                | 2   | -   | -   | -   | -   | -   | -   | -   | 1   | 1     | 1     | 1     | 1    | 1    | -    |
| CO3                                                                                                                                | 2   | -   | -   | -   | -   | -   | -   | -   | 1   | 1     | 1     | 1     | 1    | 1    | -    |
| CO4                                                                                                                                | 3   | -   | -   | -   | -   | -   | -   | -   | 1   | 1     | 1     | 1     | 1    | 1    | -    |
| CO5                                                                                                                                | 2   | -   | -   | -   | -   | -   | -   | -   | 1   | 1     | 1     | 1     | 1    | 1    | -    |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |      |      |      |

| COURSE DESIGNED BY                                       | APPROVED BY                                |
|----------------------------------------------------------|--------------------------------------------|
| Dr Beulah David - ASP/CSE<br>Prof. L.Nithya – AP(SG)/CSE | Dr.S.Pathur Nisha – Professor & Dean / CSE |
| Name and Department                                      | Name and Department of BoS Chairman        |

**SEMESTER VI**

U23CS601

**Compiler Design****Category:****PCC**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. To learn the various phases of compiler.
2. To learn the various parsing techniques.
3. To understand intermediate code generation and run-time environment.
4. To learn to implement the front-end of the compiler.
5. To learn to implement code generator and code optimization.

**UNIT 1 INTRODUCTION TO COMPILERS & LEXICAL ANALYSIS 9**

Introduction- Translators- Compilation and Interpretation- Language processors -The Phases of Compiler – Lexical Analysis – Input Buffering – Specification of Tokens – Recognition of Tokens – Finite Automata – Regular Expressions to Automata NFA, DFA – Minimizing DFA – Lex tool.

**UNIT 2 SYNTAX ANALYSIS 9**

Role of Parser – Grammars – Context-free grammars – Writing a grammar TopDown Parsing - General Strategies - Recursive Descent Parser Predictive Parser-LL (1) - Parser-Shift Reduce Parser-LR Parser- LR (0) Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC tool - Design of a syntax Analyzer for a Sample Language

**UNIT 3 SYNTAX DIRECTED TRANSLATION & INTERMEDIATE CODE GENERATION 9**

Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type Checker- Equivalence of Type Expressions-Type Conversions. Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Back patching.

**UNIT 4 RUN-TIME ENVIRONMENT AND CODE GENERATION 9**

Runtime Environments – source language issues – Storage organization – Storage Allocation Strategies: Static, Stack and Heap allocation - Parameter Passing-Symbol Tables - Dynamic Storage Allocation - Issues in the Design of a code generator – Basic Blocks and Flow graphs - Design of a simple Code Generator - Optimal Code Generation for Expressions– Dynamic Programming Code Generation.

**UNIT 5 CODE OPTIMIZATION 9**

Principal Sources of Optimization – Peep-hole optimization - DAG- Optimization of Basic Blocks - Global Data Flow Analysis - Efficient Data Flow Algorithm – Recent trends in Compiler Design.

**COURSE OBJECTIVE:**

At the end of the course, students would

- CO1:** Explain the structure and phases of a compiler and design lexical analyzers using regular expressions, finite automata, and lexical analysis tools.
- CO2:** Apply context-free grammars and parsing techniques to design and implement top-down and bottom-up syntax analyzers using standard parser generation tools.

- CO3:** Construct syntax-directed definitions and generate intermediate code with appropriate type checking and translation schemes.
- CO4:** Analyze run-time environments, storage allocation strategies, and generate efficient target code using code generation techniques.
- CO5:** Apply code optimization techniques and data flow analysis to improve the performance and efficiency of generated code.

**TOTAL: 45  
PERIODS**

**TEXT BOOKS:**

1. Douglas Thain, "Introduction to Compilers and Language Design", Second Edition, 2020
2. Aho, Lam, Sethi & Ullman, "Compilers: Principles, Techniques, and Tools", Revised/Updated Edition

**REFERENCES:**

1. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. V. Raghavan, Principles of Compiler Design, Tata McGraw Hill Education Publishers, 2010.
5. Allen I. Holub, Compiler Design in C, Prentice-Hall Software Series, 1993.

| <b>CO's-PO's &amp; PSO's MAPPING</b> |     |     |     |     |     |     |     |     |     |       |       |       |       |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|
| CO                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PSO 1 | PSO 2 |
| CO1                                  | 3   | 2   | –   | –   | 2   | -   | -   | -   | -   | 1     | 1     | 3     | 2     |
| CO2                                  | 3   | 3   | 2   | –   | 2   | -   | -   | -   | -   | 3     | 2     | 3     | 2     |
| CO3                                  | 2   | 3   | 3   | 2   | –   | -   | -   | -   | -   | 1     | 1     | 3     | 3     |
| CO4                                  | 2   | 3   | 3   | 2   | 2   | -   | -   | -   | -   | 2     | 3     | 2     | 1     |
| CO5                                  | 2   | 3   | 2   | 3   | 2   | -   | -   | -   | -   | 1     | 3     | 2     | 2     |

| COURSE DESIGNED BY    | APPROVED BY                                      |
|-----------------------|--------------------------------------------------|
| Prof. P.Aruna- AP/CSE | Dr Beaulah David – Associate Professor & HOD/CSE |
| Name and Department   | Name and Department of BoS Chairman              |

|                   |                                 |                |   |   |   |
|-------------------|---------------------------------|----------------|---|---|---|
| U23CS603<br>SDG:4 | CRYPTOGRAPHY AND CYBER SECURITY | Category : PCC |   |   |   |
|                   |                                 | L              | T | P | C |
|                   |                                 | 3              | 0 | 2 | 4 |

**COURSE OBJECTIVE:**

1. Understand fundamental concepts of computer security, including security attacks, services, and mechanisms.
2. Explain classical encryption techniques and the foundations of modern cryptography.
3. Apply mathematical principles and symmetric cryptographic algorithms for secure communication.
4. Analyze asymmetric cryptographic algorithms, key exchange methods, and key management techniques.
5. Evaluate integrity, authentication mechanisms, and cyber security challenges in modern computing environments.

**UNIT 1 INTRODUCTION TO SECURITY 9**

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques, Transposition techniques, Steganography - Cryptanalysis.

**UNIT 2 SYMMETRIC CIPHERS 9**

SYMMETRIC KEY CIPHERS: Block Ciphers – DES, Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – AES: Evaluation criteria for AES

**UNIT 3 ASYMMETRIC CRYPTOGRAPHY 9**

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Fermat's and Euler's Theorem – Chinese Remainder Theorem – Exponentiation and logarithm  
ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange.

**UNIT 4 INTEGRITY AND AUTHENTICATION ALGORITHMS 9**

Cryptographic Hash Functions - Applications of Cryptographic Hash Functions -Secure Hash Algorithm (SHA)- Message Authentication Codes (MAC) - MACs Based on Hash Functions: HMAC  
MUTUAL TRUST: Key management and distribution – Symmetric key distribution using symmetric and asymmetric encryption – Distribution of public keys – X.509 Certificates.

**UNIT 5 CYBER CRIMES AND CYBER SECURITY 9**

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security

**TOTAL: 45 PERIODS**

**PRACTICAL EXERCISES:**

1. Write a program to implement the following cipher techniques to perform encryption and decryption
  1. Caesar Cipher
  2. Playfair Cipher
  3. Hill Cipher
2. Write a program to implement the following transposition techniques
  1. Rail fence technique -Row major transformation
  2. Rail fence technique – Column major transformation
3. Write a program to implement DES algorithm
4. Write a program to implement AES algorithm
5. Write a program to implement RSA Encryption algorithm
6. Write a program to implement the Diffie-Hellman Key Exchange mechanism. Consider one of the parties as Alice and the other party as bob.
7. Write a program to calculate the message digest of a text using the SHA-1 algorithm.
8. Write a program to implement digital signature standard.
9. Demonstration of Intrusion Detection System(IDS)
10. Exploring N-Stalker, a Vulnerability Assessment Tool
11. Defeating Malware - Building Trojans

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Describe security concepts, OSI security architecture, security attacks, services, and mechanisms.

**CO2:** Explain and analyze classical and modern cryptographic techniques and cryptanalysis.

**CO3:** Apply number theory concepts and symmetric key algorithms such as DES, AES, Block cipher mode of operation.

**CO4:** Analyze and apply asymmetric cryptographic systems including RSA, Diffie-Hellman.

**CO5:** Analyze various network, cloud, web security mechanisms and cyber security crimes to protect digital environments.

**TOTAL: 75 PERIODS**

**TEXT BOOKS:**

1. William Stallings, "Cryptography and Network Security - Principles and Practice", Seventh Edition, Pearson Education, 2017.
2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber crimes, Computer Forensics and Legal Perspectives", First Edition, Wiley India, 2011.

**REFERENCES:**

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

|                                      |
|--------------------------------------|
| <b>CO's-PO's &amp; PSO's MAPPING</b> |
|--------------------------------------|

| CO                                                                                  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO12 | PSO1 | PSO2 | PSO3 |
|-------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1                                                                                 | 3   | 3   | 2   | 0   | 2   | 2   | 1   | 0   | 0   | 0    | 2    | 1    | 0    | 0    |
| CO2                                                                                 | 3   | 3   | 2   | 0   | 3   | 2   | 1   | 0   | 0   | 0    | 2    | 2    | 0    | 0    |
| CO3                                                                                 | 3   | 2   | 3   | 0   | 3   | 1   | 1   | 0   | 0   | 0    | 2    | 2    | 0    | 0    |
| CO4                                                                                 | 3   | 3   | 2   | 0   | 3   | 2   | 1   | 0   | 0   | 0    | 2    | 2    | 0    | 0    |
| CO5                                                                                 | 3   | 3   | 3   | 0   | 3   | 3   | 2   | 0   | 0   | 0    | 3    | 2    | 0    | 0    |
| Correlation levels: 1 – low      2 – medium      3 – high      “-“ - no correlation |     |     |     |     |     |     |     |     |     |      |      |      |      |      |

| COURSE DESIGNED BY        | APPROVED BY                                     |
|---------------------------|-------------------------------------------------|
| Dr Beulah David - ASP/CSE | Dr Beulah David – Associate Professor & HOD/CSE |
| Name and Department       | Name and Department of BoS Chairman             |

## SEMESTER VII

U23CS701

SOFTWARE PROJECT MANAGEMENT

Category : HSMC

SDG : 8

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVE:**

1. To understand the Software Project Planning and Evaluation techniques.
2. To plan and manage projects at each stage of the software development life cycle (SDLC).
3. To learn about the activity planning and risk management principles.
4. To manage software projects and control software deliverables.
5. To develop skills to manage the various phases involved in project management and people management.
6. To deliver successful software projects that support organization's strategic goals.

**UNIT 1 PROJECT EVALUATION AND PROJECT PLANNING 9**

Importance of Software Project Management – Activities - Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

**UNIT 2 PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9**

Software process and Process Models – Choice of Process models - Rapid Application development – Agile methods – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

**UNIT 3 ACTIVITY PLANNING AND RISK MANAGEMENT 9**

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique

**UNIT 4 PROJECT MANAGEMENT AND CONTROL 9**

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

**UNIT 5 STAFFING IN SOFTWARE PROJECTS 9**

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

**COURSE OUTCOMES:**

At the end of the course, students would

CO1: Understanding software project management principles, methodologies, and process models.

CO2: Applying project planning, estimation, scheduling, and resource allocation techniques.

CO3: Analyzing project risks, schedules, critical paths, and resource requirements.

CO4: Evaluating project performance, cost control, change management, and configuration management practices.

CO5: Assessing leadership, communication, team management, and ethical practices in software projects.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Bob Hughes, Mike Cotterell and Rajib Mall: *Software Project Management – Fifth Edition*, Tata McGraw Hill, New Delhi, 2012.

**REFERENCES:**

1. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication, 2011.

2. Walker Royce: “Software Project Management”- Addison-Wesley, 1998.

3. Gopalaswamy Ramesh, “Managing Global Software Projects” – McGraw Hill Education (India), Fourteenth Reprint 2013.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                |     |     |     |     |     |     |     |     |     |       |       |      |      |      |
|---------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|------|------|------|
| CO                                                                  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PSO1 | PSO2 | PSO3 |
| CO1                                                                 | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -     | 2     | 3    | 2    | -    |
| CO2                                                                 | 3   | 3   | 2   | 2   | 2   | -   | -   | -   | -   | -     | 3     | 2    | 3    | -    |
| CO3                                                                 | 3   | 3   | 2   | 3   | 2   | -   | -   | -   | -   | -     | 3     | 3    | 3    | 2    |
| CO4                                                                 | 2   | 3   | 2   | 3   | 2   | -   | -   | -   | -   | -     | 3     | 2    | 2    | -    |
| CO5                                                                 | -   | -   | -   | -   | -   | -   | -   | 3   | 3   | 3     | 2     | 2    | 3    | -    |
| Correlation levels: 1 – low 2 – medium 3 – high “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |      |      |      |

U23CS702  
SDG :4

**CLOUD COMPUTING VIRTUALIZATION**

**Category : PCC**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>2</b> | <b>4</b> |

**COURSE OBJECTIVE:**

1. Understand cloud computing architectures, service models, and deployment models.
2. Analyze virtualization technologies for compute, storage, and networking.

3. Deploy and manage cloud-native applications using containers and Kubernetes.
4. Work with AWS, Azure, Google Cloud, and open-source cloud platforms
5. Evaluate cloud security, governance, multi-cloud, edge, and AI-enabled cloud solutions.

## **UNIT 1** **CLOUD COMPUTING FUNDAMENTALS** **9**

Introduction to distributed computing and cloud computing - Evolution of cloud computing - Characteristics and essential features of cloud computing - Cloud service models - Cloud deployment models - Cloud architecture - Virtualization overview - Cloud economics - Elasticity - Scalability - Resource pooling - On-demand services - Measured services - Service Level Agreements (SLAs) - Cloud adoption strategies - Applications of Cloud.

## **UNIT 2** **VIRTUALIZATION TECHNOLOGIES** **9**

Introduction to virtualization - Virtualization concepts and benefits - Hypervisor architecture - Type-I and Type-II hypervisors - Virtual machine architecture - CPU virtualization - Memory virtualization - Storage virtualization - Server virtualization - Desktop virtualization - Network virtualization - Virtual machine provisioning - Snapshots - Cloning - Live migration - Resource scheduling - Software Defined Networking (SDN) - Network Function Virtualization (NFV) - Virtualization performance optimization - Virtualization use cases.

## **UNIT 3** **CLOUD INFRASTRUCTURE AND PLATFORMS** **9**

Cloud data center architecture - Distributed storage systems - SAN - NAS - RAID technologies - Resource provisioning - Cloud storage services - Virtual networking - Load balancing - Auto scaling - Fault tolerance - Cloud monitoring - Identity and Access Management (IAM) - Cloud orchestration - Amazon Web Services (AWS) - Microsoft Azure - Google Cloud Platform (GCP) - OpenStack architecture - Cloud deployment - Infrastructure management.

## **UNIT 4** **CONTAINERS AND CLOUD-NATIVE COMPUTING** **9**

Containerization concepts - Docker architecture - Docker Engine - Docker Hub - Docker images - Containers - Dockerfile - Container lifecycle management - Docker networking - Persistent storage using volumes - Docker Compose - Kubernetes architecture - Pods - ReplicaSets - Deployments - Services - ConfigMaps - Secrets - Container orchestration - Microservices architecture - Serverless computing - Function as a Service (FaaS) - CI/CD pipelines - DevOps integration - Cloud-native application deployment.

## **UNIT 5** **CLOUD SECURITY AND EMERGING TRENDS** **9**

Cloud security fundamentals - Identity and Access Management (IAM) - Authentication and authorization - Encryption techniques - Key management - Privacy and compliance - Disaster recovery - Backup and business continuity - Virtualization attacks - Cloud security threats and mitigation techniques - Security monitoring - Edge computing - Fog computing - Hybrid cloud - Multi-cloud computing - AI-enabled cloud services - Green cloud computing - Sustainable cloud infrastructure - Emerging trends in cloud computing.

### **PRACTICAL EXERCISES: -**

- Experiment 1: Install and configure VirtualBox/VMware; create virtual machines.
- Experiment 2: Install Linux VM and configure CPU, memory and storage.
- Experiment 3: Configure NAT, bridged and host-only networking.
- Experiment 4: Perform VM snapshot, backup and cloning operations.
- Experiment 5: Install Docker and manage containers.
- Experiment 6: Create custom Docker images using Dockerfiles.
- Experiment 7: Implement Docker volumes and networking.

Experiment 8: Deploy applications using Kubernetes pods and services.

Experiment 9: Launch and manage cloud virtual machines and storage services.

Experiment 10: Mini Project: Containerized web application deployment on cloud.

### **COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Explain the fundamentals of cloud computing, virtualization, cloud platforms, containerization, cloud security, and emerging cloud technologies.

**CO2:** Apply cloud platforms, virtualization, Docker, and Kubernetes to deploy and manage cloud applications.

**CO3:** Analyze cloud architectures, virtualization techniques, and cloud-native solutions for diverse computing environments.

**CO4:** Evaluate cloud security, governance, and emerging cloud technologies for secure and scalable cloud solutions.

**CO5:** Design cloud-native applications using cloud platforms, containers, Kubernetes, and DevOps practices.

**TOTAL: 45+30 PERIODS**

### **TEXT BOOKS:**

1. Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi, Mastering Cloud Computing: Foundations and Applications Programming, McGraw-Hill Education, First Edition, 2013.
2. Kai Hwang, Geoffrey C. Fox, and Jack G. Dongarra, Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Morgan Kaufmann (Elsevier), First Edition, 2012.
3. Bernstein David, Eric A. Newcomer, Principles of Cloud Computing, CRC Press, Second Edition, 2016.
4. Nigel Poulton, The Docker Book: Containerization is the New Virtualization, Lean Publishing, Latest Edition.
5. Marko Lukša, Kubernetes in Action, Manning Publications, Second Edition, 2023.

### **REFERENCES:**

1. Thomas Erl, Ricardo Puttini, and Zaigham Mahmood, Cloud Computing: Concepts, Technology & Architecture, Pearson Education, 2014.
2. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., Second Edition, 2018.
3. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly Media, First Edition, 2009.
4. Brendan Burns, Joe Beda, and Kelsey Hightower, Kubernetes: Up and Running, O'Reilly Media, Third Edition, 2022.
5. Sam Newman, Building Microservices, O'Reilly Media, Second Edition, 2021.

### **CO's-PO's & PSO's MAPPING**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |  | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|--|------|------|------|
| CO1 | 3   | 3   | -   | -   | 3   | -   | -   | -   | -   | -    | 3    |  | 2    | 3    | 1    |
| CO2 | 3   | 3   | 2   | -   | 3   | -   | -   | -   | -   | -    | 3    |  | 3    | 2    | 3    |
| CO3 | 2   | 3   | 3   | 3   | 3   | -   | -   | -   | -   | -    | 2    |  | 3    | 3    | 2    |

|                                                                                                                 |   |   |   |   |   |   |   |   |   |   |   |  |   |   |   |
|-----------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|--|---|---|---|
| CO4                                                                                                             | 2 | 3 | 2 | 3 | 3 | - | - | - | - | - | 3 |  | 2 | 3 | 2 |
| CO5                                                                                                             | 2 | 2 | 3 | 3 | 3 | - | - | - | - | - | 3 |  | 3 | 2 | 3 |
| Correlation levels:      1 – low              2 – medium              3 – high              “-”- no correlation |   |   |   |   |   |   |   |   |   |   |   |  |   |   |   |

| COURSE DESIGNED BY                         | APPROVED BY                                |
|--------------------------------------------|--------------------------------------------|
| Dr.S.Pathur Nisha – Professor & Dean / CSE | Dr.S.Pathur Nisha – Professor & Dean / CSE |
| Name and Department                        | Name and Department of BoS Chairman        |

U23CS711

PROJECT PHASE- I / INTERNSHIP

Category : PCC

SDG

|   |   |   |   |
|---|---|---|---|
| L | T | P | C |
| 0 | 0 | 4 | 2 |

:4,8,9,17

**COURSE OBJECTIVE:**

1. Develop domain knowledge and technical skills through industrial/research exposure.
2. Identify and analyze real-world problems and understand their requirements and constraints.
3. Apply appropriate engineering principles, algorithms, methodologies, and modern tools to formulate a project problem.
4. Develop preliminary system architecture, module-level design, and an implementation plan.
5. Enhance professional skills through teamwork, technical communication, documentation, and interaction with industry/research professionals.

The students shall individually or in groups undertake work related to business/industry/research domains and associated problems approved by the Department and/or the organization offering the internship/project. The student may select a topic relevant to his/her programme specialization. The students shall carry out the work under the guidance of the supervisor and follow a formulated methodology.

During Project Phase–I/Internship, the students shall focus on understanding the selected domain/problem, identifying and defining the problem, conducting a detailed literature survey, analyzing requirements, formulating the methodology, and developing the preliminary design/prototype, wherever applicable. At the end of the semester, the students shall submit a report documenting the problem definition, domain study, literature review, proposed methodology, preliminary design/development, and progress of the work in the prescribed format.

The students shall be evaluated based on their work, report, presentation, and viva-voce examination by the supervisor/review committee/panel of examiners as per the applicable Regulations.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Acquire domain knowledge and technical skills required to understand and analyze industry/research problems.

**CO2:** Analyze the identified problem and formulate requirements, solution architecture, module-level designs, and suitable algorithms.

**CO3:** Apply appropriate programming languages, frameworks, methodologies, and modern engineering tools to develop a preliminary solution/prototype.

**CO4:** Demonstrate professional skills through teamwork, technical documentation, presentations, and interaction with industry/research professionals.

**TOTAL: 60 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                            |     |     |     |     |     |     |     |     |     |      |      |  |      |      |      |
|-----------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|--|------|------|------|
| CO                                                                                                              | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |  | PSO1 | PSO2 | PSO3 |
| CO1                                                                                                             | 3   | 3   | 2   | 2   | 2   | 2   | 1   | 1   | -   | 1    | 1    |  | 2    | 3    | 2    |
| CO2                                                                                                             | 3   | 3   | 3   | 2   | 3   | 1   | 1   | 1   | 1   | 1    | 2    |  | 3    | 3    | 2    |
| CO3                                                                                                             | 3   | 2   | 3   | 2   | 3   | 1   | 1   | 1   | 2   | 1    | 2    |  | 3    | 2    | 2    |
| CO4                                                                                                             | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 2   | 3   | 3    | 2    |  | 2    | 2    | 3    |
| Correlation levels:      1 – low              2 – medium              3 – high              “-“- no correlation |     |     |     |     |     |     |     |     |     |      |      |  |      |      |      |

## SEMESTER VIII

U23CS811

SDG :4

## PROJECT PHASE- II / INTERNSHIP

Category : PCC

| L | T | P  | C  |
|---|---|----|----|
| 0 | 0 | 20 | 10 |

**COURSE OBJECTIVE:**

1. Develop and implement an engineering solution to the identified industry/research problem.
2. Apply appropriate algorithms, technologies, software tools, and engineering methodologies to develop the proposed solution.
3. Test, validate, evaluate, and deploy the developed solution on the target platform.
4. Analyze experimental results and assess the effectiveness, limitations, and performance of the proposed solution.
5. Demonstrate professional competencies through teamwork, technical documentation, presentation, project management, and consideration of ethical and societal aspects.

The students shall individually or in groups continue the work undertaken in Project Phase-I or undertake an approved project related to a business/industry/research problem relevant to their programme specialization. The project topic shall be approved by the Department and/or the organization offering the internship/project and shall be carried out under the guidance of the supervisor.

During Project Phase-II, the students shall continue the work based on the formulated methodology and complete the design, implementation, testing, validation, evaluation, and deployment of the proposed solution, wherever applicable. The students shall analyze and discuss the results and draw appropriate conclusions. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed project report containing the problem definition, literature review, methodology, design and implementation, results and discussion, conclusion, and references shall be prepared as per the prescribed format and submitted to the Head of the Department.

The students shall be evaluated based on the quality and progress of the project work, technical report, demonstration, presentation, and viva-voce examination by a panel of examiners as per the applicable Regulations.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** Apply domain knowledge, engineering principles, and appropriate technologies to develop a solution for the identified industry/research problem.

**CO2:** Design and implement the solution using appropriate architecture, algorithms, programming techniques, and modern engineering tools.

**CO3:** Test, validate, evaluate, and deploy the developed solution on the target platform.

**CO4 :** Analyze the results, limitations, and effectiveness of the proposed solution and draw appropriate conclusions

**CO5:** Demonstrate effective teamwork, technical communication, documentation, project management, and professional ethics through the project presentation and report.

**TOTAL: 300 PERIODS**

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                   |            |            |            |            |            |            |            |            |            |             |             |  |             |             |             |
|--------------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|--|-------------|-------------|-------------|
| <b>CO</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> |
| <b>C01</b>                                                                                             | 3          | 3          | 3          | 2          | 3          | 2          | 1          | 1          | 1          | 1           | 2           |  | 3           | 3           | 2           |
| <b>C02</b>                                                                                             | 3          | 3          | 3          | 3          | 3          | 1          | 1          | 1          | 2          | 1           | 2           |  | 3           | 3           | 2           |
| <b>C03</b>                                                                                             | 3          | 3          | 3          | 3          | 3          | 2          | 1          | 1          | 2          | 2           | 2           |  | 3           | 3           | 2           |
| <b>C04</b>                                                                                             | 3          | 3          | 2          | 3          | 2          | 2          | 2          | 2          | 1          | 2           | 2           |  | 2           | 3           | 2           |
| <b>C05</b>                                                                                             | 1          | 1          | 1          | 1          | 1          | 2          | 2          | 3          | 3          | 3           | 3           |  | 2           | 2           | 3           |
| <b>Correlation levels:</b> <b>1 – low</b> <b>2 – medium</b> <b>3 – high</b> <b>“-“- no correlation</b> |            |            |            |            |            |            |            |            |            |             |             |  |             |             |             |

**MANDATORY COURSES**

|                                         |                               |                      |          |          |          |
|-----------------------------------------|-------------------------------|----------------------|----------|----------|----------|
| <b>U23MC302</b><br><b>SDG:3,4&amp;8</b> | <b>UNIVERSAL HUMAN VALUES</b> | <b>Category : MC</b> |          |          |          |
|                                         |                               | <b>L</b>             | <b>T</b> | <b>P</b> | <b>C</b> |
|                                         |                               | <b>2</b>             | <b>0</b> | <b>0</b> | <b>0</b> |

**COURSE OBJECTIVE:**

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

|               |                                        |          |
|---------------|----------------------------------------|----------|
| <b>UNIT 1</b> | <b>INTRODUCTION TO VALUE EDUCATION</b> | <b>6</b> |
|---------------|----------------------------------------|----------|

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.

|               |                                   |          |
|---------------|-----------------------------------|----------|
| <b>UNIT 2</b> | <b>HARMONY IN THE HUMAN BEING</b> | <b>6</b> |
|---------------|-----------------------------------|----------|

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

|               |                                          |          |
|---------------|------------------------------------------|----------|
| <b>UNIT 3</b> | <b>HARMONY IN THE FAMILY AND SOCIETY</b> | <b>6</b> |
|---------------|------------------------------------------|----------|

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

|               |                                        |          |
|---------------|----------------------------------------|----------|
| <b>UNIT 4</b> | <b>HARMONY IN THE NATURE/EXISTENCE</b> | <b>6</b> |
|---------------|----------------------------------------|----------|

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic

Perception of Harmony in Existence.

**UNIT 5      IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A  
LOOK AT PROFESSIONAL ETHICS**

**6**

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** To become more aware of themselves, and their surroundings (family, society, nature)

**CO2:** To become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

**CO3:** To have better critical ability.

**CO4:** To become sensitive to their commitment towards what they have understood (human values, human relationship and human society)

**CO5:** To apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

**TOTAL: 30 PERIODS**

**TEXT BOOKS:**

1. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
2. The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G

**REFERENCES:**

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)
14. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

15. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
16. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
17. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
18. A N Tripathy, 2003, Human Values, New Age International Publishers.
19. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
20. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
21. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
23. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

| <b>CO's-PO's &amp; PSO's MAPPING</b>                                                                                               |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO                                                                                                                                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1                                                                                                                                | 1   | 1   | 1   | 1   | 1   | 3   | 3   | 0   | 0   | 1     | 1     | 3     | 2     | 1     | 1     |
| CO2                                                                                                                                | 1   | 1   | 1   | 1   | 1   | 2   | 0   | 2   | 0   | 1     | 1     | 3     | 2     | 1     | 2     |
| CO3                                                                                                                                | 1   | 1   | 1   | 1   | 1   | 0   | 2   | 0   | 0   | 1     | 1     | 3     | 2     | 2     | 1     |
| CO4                                                                                                                                | 1   | 1   | 1   | 1   | 1   | 3   | 3   | 3   | 0   | 1     | 1     | 3     | 2     | 3     | 1     |
| CO5                                                                                                                                | 1   | 1   | 1   | 1   | 1   | 3   | 3   | 3   | 0   | 1     | 1     | 3     | 2     | 1     | 2     |
| Correlation levels: 1 – low                      2 – medium                      3 – high                      “-“- no correlation |     |     |     |     |     |     |     |     |     |       |       |       |       |       |       |

| COURSE DESIGNED BY                         | APPROVED BY                                |
|--------------------------------------------|--------------------------------------------|
| Dr.S.Pathur Nisha – Professor & Head / CSE | Dr.S.Pathur Nisha – Professor & Head / CSE |
| Name and Department                        | Name and Department of BoS Chairman        |

|                   |                                             |               |   |   |   |
|-------------------|---------------------------------------------|---------------|---|---|---|
| U23MC403<br>SDG:4 | ENVIRONMENTAL SCIENCE AND CLIMATE<br>CHANGE | Category : MC |   |   |   |
|                   |                                             | L             | T | P | C |
|                   |                                             | 2             | 0 | 0 | 0 |

**COURSE OBJECTIVE:**

1. Study the interrelationship between living organism and environment
2. Assess the environmental pollution and its impact.
3. Understand the significance of natural resources and their conservation.
4. Identify and implement scientific, economic and political solutions to environmental problems.
5. Understand the influence of human population on environmental issues and role of information technology as a tool to minimize the environmental problems.

|               |                                    |          |
|---------------|------------------------------------|----------|
| <b>UNIT 1</b> | <b>ECOSYSTEMS AND BIODIVERSITY</b> | <b>6</b> |
|---------------|------------------------------------|----------|

Definition, Scope and importance of environment - Concept of an ecosystem - Structure and function of an ecosystem (Grassland and River ecosystem only) - Food chains, Food webs and ecological pyramids - Introduction to biodiversity- Definition- Genetic, Species and ecosystem diversity - Value of biodiversity - Threats to biodiversity- Conservation of biodiversity. Case study of simple ecosystems -pond, river, hill slopes, etc.

|               |                                |          |
|---------------|--------------------------------|----------|
| <b>UNIT 2</b> | <b>ENVIRONMENTAL POLLUTION</b> | <b>6</b> |
|---------------|--------------------------------|----------|

Definition - Causes, Effects and control measures of (a) Air pollution (b) Water pollution (c) Thermal pollution - Solid waste management: Causes, Effects and control measures of municipal solid wastes - Role of an individual in prevention of pollution - Pollution case studies -Disaster management - Floods, Earthquake, Cyclone and landslides. Case study of local polluted site - Urban / Rural / Industrial / Agricultural.

## UNIT 3 NATURAL RESOURCES 6

Forest resources - Use and over-exploitation, Deforestation - Water resources - Use and over-utilization of surface and ground water, Drought, Conflicts over water, dams-Benefits and problems - Food resources- Changes caused by agriculture and overgrazing, Effects of modern agriculture, Fertilizer-pesticide problems, water logging, Salinity-Role of an individual in conservation of natural resources (National and International level).

|               |                                                        |          |
|---------------|--------------------------------------------------------|----------|
| <b>UNIT 4</b> | <b>SOCIAL ISSUES AND SUSTAINABILITY<br/>MANAGEMENT</b> | <b>6</b> |
|---------------|--------------------------------------------------------|----------|

Unsustainable to sustainable development- millennium development goals, and protocols- Sustainable Development Goals-targets- Zero waste and R concept - ISO 14000 Series- Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials- Sustainable transports –Carbon credit, Carbon footprint.

## UNIT 5 CLIMATE CHANGE AND THE ENVIRONMENT 6

Trends of global warming and climate change: Global Warming Potential (GWP) & climate change - Impact of climate change on atmosphere - Acid rain - Ozone layer depletion - Weather patterns - Sea level rise - Spread of human diseases - Pandemic issues and management-Role of information technology in environment and human health - Case studies.

**COURSE OUTCOMES:**

At the end of the course, students would

**CO1:** The students will able to understand the basis of ecological principles and environmental regulations which in turn helps in sustainable development and human population and environment. Use and over exploitation of forest and water and food resources.

**CO2:** The students will able to understand various schemes for the protection of species, role of an individual in prevention of pollution and conservation of natural resources

**CO3:** The students will able to understand design of pollution control structures, resettlement and rehabilitation of people, welfare about the women and child.

**CO4:** The students will able to apply enough knowledge of implement various Environmental ethics, regulations and schemes, Pandemic issues and management, dams-benefits and problems, conservation of biodiversity.

**CO5:** The students will able to analyze the climate change and its impact on environment. Climate change, global warming, acid rain and ozone layer depletion.

**TOTAL: 30 PERIODS**

**TEXT BOOKS:**

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2017.
2. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2016.
3. George Tchobanoglous, Frank Kreith, "Handbook of Solid Waste Management" (McGraw-Hill Handbooks), McGraw-Hill Education, 2<sup>nd</sup> Edition July 2017.

**REFERENCES:**

1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media. 2015.
2. ErachBharucha, "Textbook of Environmental Studies", Universities Press (I) Private Limited, Hydrabad, 2015.
3. Rajagopalan R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.

**CO's-PO's & PSO's MAPPING**

| CO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| CO1 | 3   | 1   | 1   | 1   | -   | -   | 1   | -   | 1   | 1     | -     | 1     | -     | -     | -     |
| CO2 | 3   | 1   | 1   | 1   | -   | -   | 1   | -   | 1   | 1     | -     | 1     | -     | -     | -     |
| CO3 | 3   | 1   | 1   | 1   | -   | -   | 1   | -   | 1   | 1     | -     | 1     | -     | -     | -     |
| CO4 | 3   | 1   | 1   | 1   | -   | -   | 1   | -   | 1   | 1     | -     | 1     | -     | -     | -     |
| CO5 | 3   | 1   | 1   | 1   | -   | -   | 1   | -   | 1   | 1     | -     | 1     | -     | -     | -     |

|                            |                |                   |                 |                            |
|----------------------------|----------------|-------------------|-----------------|----------------------------|
| <b>Correlation levels:</b> | <b>1 – low</b> | <b>2 – medium</b> | <b>3 – high</b> | <b>“-“- no correlation</b> |
|----------------------------|----------------|-------------------|-----------------|----------------------------|

| <b>COURSE DESIGNED BY</b>  | <b>APPROVED BY</b>                              |
|----------------------------|-------------------------------------------------|
| Dr.M.Kumaresan- Prof / S&H | Dr.K.Parimalagandhi – Professor & Head<br>/ S&H |
| <b>Name and Department</b> | <b>Name and Department of BoS<br/>Chairman</b>  |

### SUSTAINABLE DEVELOPMENT GOALS

| SDG | Short Form                              | Full Form                                                                                                                                                                                    |
|-----|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | No Poverty                              | End poverty in all its forms everywhere                                                                                                                                                      |
| 2   | Zero Hunger                             | End hunger, achieve food security and improved nutrition, And promote sustainable agriculture                                                                                                |
| 3   | Good health and well being              | Ensure healthy lives and promote well-being for all at all Ages                                                                                                                              |
| 4   | Quality education                       | Ensure inclusive and equitable quality education and Promote life long learning opportunities for all                                                                                        |
| 5   | Gender Equality                         | Achieve gender equality and empower all women and girls                                                                                                                                      |
| 6   | Clean water and sanitation              | Ensure availability and sustainable management of water and sanitation for all                                                                                                               |
| 7   | Affordable and clean energy             | Ensure access to affordable, reliable, sustainable and modern energy for all                                                                                                                 |
| 8   | Decent work and Economic Growth         | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all                                                                         |
| 9   | Industry, Innovation and Infrastructure | Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation                                                                                    |
| 10  | Reducing Inequality                     | Reduce income inequality within and among countries                                                                                                                                          |
| 11  | Sustainable cities and communities      | Make cities and human settlements inclusive, safe, Resilient and sustainable                                                                                                                 |
| 12  | Responsible consumption and production  | Ensure sustainable consumption and production patterns                                                                                                                                       |
| 13  | Climate action                          | Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy                                                           |
| 14  | Life below water                        | Conserve and sustainably use the oceans, seas and marine Resources for sustainable development                                                                                               |
| 15  | Life on Land                            | Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and Halt biodiversity loss |
| 16  | Peace, justice and string Institutions  | Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels            |
| 17  | Partnerships for the goals              | Strengthen the means of implementation and revitalize the Global partnership for sustainable development                                                                                     |