

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. COMPUTER SCIENCE AND ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

1. To enable graduates to pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs. To ensure that graduates will have the ability and attitude to adapt to emerging technological changes.

PROGRAM OUTCOMES POs:

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

To apply software engineering principles and practices for developing quality software for scientific and business applications.

To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Mapping of POs/PSOs to PEOs

| | | | |
|--------------|---------------|----------------|-----------|
| Contribution | 1: Reasonable | 2: Significant | 3: Strong |
|--------------|---------------|----------------|-----------|

| | PEOs | |
|---|--|---|
| POs | 1. Graduates will pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs. | 2. Graduates will have the ability and attitude to adapt to emerging technological changes. |
| 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | 3 | 1 |
| 2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | 3 | 1 |
| 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | 3 | 2 |
| 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. | 3 | 2 |
| 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. | 2 | 3 |
| 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. | 2 | 2 |

| | | |
|--|---|---|
| 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. | 2 | 1 |
| 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. | 3 | 1 |
| 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | 3 | 2 |
| 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 3 | 2 |
| 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. | 2 | 2 |
| 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. | 1 | 3 |
| | | |

| PSOs | | |
|---|---|---|
| 1. Analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering. | 3 | 1 |
| 2. Apply software engineering principles and practices for developing quality software for scientific and business applications. | 3 | 1 |
| 3. Adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems. | 1 | 3 |

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Course Outcomes and Programme Outcomes is given in the following table

| | Course Title | Programme Outcome (PO) | | | | | | | | | | | |
|--------------------|---|------------------------|---|---|---|---|---|---|---|---|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| SEMESTER I | Communicative English | | | | | | | | √ | √ | √ | | √ |
| | Engineering Mathematics - I | √ | √ | √ | | | | | | √ | | | |
| | Engineering Physics | √ | √ | √ | | | | | | | | | |
| | Engineering Chemistry | √ | √ | √ | | | | | | | | | |
| | Problem Solving and Python Programming | √ | √ | √ | | | | | | | | | |
| | Engineering Graphics | √ | √ | √ | | √ | | | √ | √ | √ | | √ |
| | Problem Solving and Python Programming Laboratory | √ | √ | √ | | √ | | | √ | √ | √ | | √ |
| | Physics and Chemistry Laboratory | √ | √ | √ | | | | | √ | √ | √ | | |
| | | | | | | | | | | | | | |
| SEMESTER II | Technical English | | | | | | | | √ | √ | √ | | √ |
| | Engineering Mathematics II | √ | √ | √ | | | | | | √ | | | |
| | Physics for Information Science | √ | √ | √ | | | | | | | | | |
| | Basic Electrical, Electronics and Measurement Engineering | √ | √ | √ | | | | | | | | | |
| | Environmental Science and Engineering | √ | √ | √ | | | | √ | √ | √ | √ | | √ |
| | Programming in C | √ | √ | √ | | | | | √ | √ | √ | | √ |
| | Engineering Practices Laboratory | √ | √ | √ | √ | √ | √ | | √ | √ | √ | | √ |
| | C Programming Laboratory | √ | √ | √ | | | | | √ | √ | √ | | √ |

| PROGRAMME OUTCOME (PO) | | | | | | | | | | | | | | | | |
|--|-----------------------|---|---|---|---|---|---|---|---|---|---|----|----|----|---|---|
| YEAR II | SEMESTER III | COURSE TITLE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| | | Discrete Mathematics | √ | √ | √ | | | | | | | √ | | | | |
| | | Digital Principles and Design | √ | √ | √ | | | | | | | | | | | |
| | | Data Structures | √ | √ | √ | | | | | | | | | | | |
| | | Object Oriented Programming | √ | √ | √ | | | | | | | | | | | |
| | | Communication Engineering | √ | √ | √ | | | | | | | | | | | |
| | | Data Structures Laboratory | √ | √ | √ | | | | | | √ | √ | √ | | | √ |
| | | Object Oriented Programming Laboratory | √ | √ | √ | | | | | | √ | √ | √ | | | √ |
| | | Digital Systems Laboratory | √ | √ | √ | | | | √ | | √ | √ | √ | | | √ |
| | | Interpersonal Skills/Listening & Speaking | | | | | | | | | √ | √ | √ | | | √ |
| | SEMESTER IV | Probability and Queueing Theory | √ | √ | √ | | | | | | | √ | √ | | √ | |
| | Computer Architecture | √ | √ | √ | | | | | | | | | | | | |
| Database Management Systems | √ | √ | √ | | | | | | | | | | | | | |
| Design and Analysis of Algorithms | √ | √ | √ | | | | | | | √ | √ | | | √ | | |
| Operating Systems | √ | √ | √ | | | | | | | | | | | | | |
| Software Engineering | √ | √ | √ | | √ | √ | | | √ | √ | √ | | | √ | | |
| Database Management Systems Laboratory | √ | √ | √ | | | | | | √ | √ | √ | | | √ | | |
| Operating Systems Laboratory | √ | √ | √ | | | | | | √ | √ | √ | | | √ | | |
| Advanced Reading and Writing | | | | | | | | | √ | √ | √ | | | √ | | |

| | | | | | | | | | | | | | | | |
|----------|--------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YEAR III | SEMESTER V | Algebra and Number Theory | √ | √ | √ | | | | | | √ | | | | |
| | | Computer Networks | √ | √ | √ | | | | | | | | | | |
| | | Microprocessors and Microcontrollers | √ | √ | √ | | | | | | | | | | |
| | | Theory of Computation | √ | √ | √ | | | | | | | | | | |
| | | Object Oriented Analysis and Design | √ | √ | √ | | | √ | | | | | | | |
| | | Open Elective I | | | | | | | | | | | | | |
| | | Microprocessors and Microcontrollers Laboratory | √ | √ | √ | | | | | √ | √ | √ | | | √ |
| | | Object Oriented Analysis and Design Laboratory | √ | √ | √ | | √ | √ | | √ | √ | √ | | | √ |
| | | Networks Laboratory | √ | √ | √ | | | | | √ | √ | √ | | | √ |
| | | | | | | | | | | | | | | | |
| | SEMESTER VI | Internet Programming | √ | √ | √ | | | | | √ | √ | √ | | √ | |
| | | Artificial Intelligence | √ | √ | √ | | | | | | | | | | |
| | | Mobile Computing | √ | √ | √ | | | | | | | | | | |
| | | Compiler Design | √ | √ | √ | | | | | √ | √ | √ | | √ | |
| | | Distributed Systems | √ | √ | √ | | | | | | | | | | |
| | | Professional Elective I | | | | | | | | | | | | | |
| | | Internet Programming Laboratory | √ | √ | √ | | √ | | | √ | √ | √ | | √ | |
| | | Mobile Application Development Laboratory | √ | √ | √ | | √ | √ | | √ | √ | √ | | √ | |
| | | | | | | | | | | | | | | | |
| | | Mini Project | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | |
| | | Professional Communication | | | | | | √ | | | √ | | √ | | |
| | | | | | | | | | | | | | | | |
| YEAR IV | SEMESTER VII | Principles of Management | √ | √ | √ | | | | | | | | √ | | |
| | | Cryptography and Network Security | √ | √ | √ | | | | | | | | | | |
| | | Cloud Computing | √ | √ | √ | | | | | | | | | | |
| | | Open Elective II | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|--|----------------------|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Professional Elective II | | | | | | | | | | | | |
| | | Professional Elective III | | | | | | | | | | | | |
| | | Cloud Computing Laboratory | √ | √ | √ | | √ | | | √ | √ | √ | | √ |
| | | Security Laboratory | √ | √ | √ | | √ | | | √ | √ | √ | | √ |
| | | | | | | | | | | | | | | |
| | SEMESTER VIII | Professional Elective IV | | | | | | | | | | | | |
| | | Professional Elective V | | | | | | | | | | | | |
| | | Project Work | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

PROFESSIONAL ELECTIVES

| SEM | COURSE TITLE | PROGRAMME OUTCOME (PO) | | | | | | | | | | | |
|------------------------------|---|------------------------|---|---|---|---|---|---|---|---|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| VI | Data Warehousing and Data Mining | √ | √ | √ | | | | | | | | | |
| | Software Testing | √ | √ | √ | | √ | | | | √ | √ | | |
| | Embedded Systems | √ | √ | √ | | | | | | | | | |
| | Agile Methodologies | √ | √ | √ | | | | | | | | | |
| | Graph Theory and Applications- Intellectual Property Rights | √ | √ | √ | | | √ | √ | √ | √ | √ | √ | √ |
| | Digital Signal Processing | √ | √ | √ | | | | | | | | | |
| VII | Big Data Analytics | √ | √ | √ | | √ | | | | √ | √ | | |
| | Machine Learning Techniques | √ | √ | √ | | √ | | | | √ | √ | | |
| | Computer Graphics and Multimedia | √ | √ | √ | | | | | | | | | |
| | Software Project Management | √ | √ | √ | | | √ | | √ | √ | √ | √ | √ |
| | Internet of Things | √ | √ | √ | | | | | | | | | |
| | Service Oriented Architecture | √ | √ | √ | | | | | | | | | |
| | Total Quality Management | √ | √ | √ | | | | | | | | | √ |
| | Multi-core Architectures and Programming | √ | √ | √ | | | | | | | | | |
| | Human Computer Interaction | √ | √ | √ | | | | | | | | | |
| | C# and .Net Programming | √ | √ | √ | | √ | | | | √ | √ | | |
| | Wireless Adhoc and Sensor Networks | √ | √ | √ | | | | | | | | | |
| | Advanced Topics on Databases | √ | √ | √ | | | | | | | | | |
| | Foundation Skills in Integrated Product Development | √ | √ | √ | | | | | | | | | |
| | Human Rights | √ | √ | √ | | | | | | | | | |
| | Disaster Management | √ | √ | √ | | | | √ | | | | | |
| VIII | Digital Image Processing | √ | √ | √ | | | | | | | | | |
| | Social Network Analysis | √ | √ | √ | | | | | | | | | |
| | Information Security | √ | √ | √ | | | | | √ | | | | |
| | Software Defined Networks | √ | √ | √ | | | | | | | | | |
| | Cyber Forensics | √ | √ | √ | | | | | √ | | | | |
| | Soft Computing | √ | √ | √ | | | | | | | | | |
| | Professional Ethics in Engineering | | | | | | √ | √ | √ | √ | √ | | √ |
| | Information Retrieval Techniques | √ | √ | √ | | | | | | | | | |
| | Green Computing | √ | √ | √ | | | | | | | | | |
| | GPU Architecture and Programming | √ | √ | √ | | | | | | | | | |
| | Natural Language Processing | √ | √ | √ | | | | | | | | | |
| | Parallel Algorithms | √ | √ | √ | | | | | | | | | |
| | Speech Processing | √ | √ | √ | | | | | | | | | |
| Fundamentals of Nano Science | √ | √ | √ | | | | | | | | | | |

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. COMPUTER SCIENCE AND ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
I - VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|---|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | HS8151 | Communicative English | HS | 4 | 4 | 0 | 0 | 4 |
| 2. | MA8151 | Engineering Mathematics - I | BS | 4 | 4 | 0 | 0 | 4 |
| 3. | PH8151 | Engineering Physics | BS | 3 | 3 | 0 | 0 | 3 |
| 4. | CY8151 | Engineering Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 5. | GE8151 | Problem Solving and Python Programming | ES | 3 | 3 | 0 | 0 | 3 |
| 6. | GE8152 | Engineering Graphics | ES | 6 | 2 | 0 | 4 | 4 |
| PRACTICALS | | | | | | | | |
| 7. | GE8161 | Problem Solving and Python Programming Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 8. | BS8161 | Physics and Chemistry Laboratory | BS | 4 | 0 | 0 | 4 | 2 |
| TOTAL | | | | 31 | 19 | 0 | 12 | 25 |

SEMESTER II

| Sl.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|---|----------|-----------------|-----------|----------|----------|-----------|
| THEORY | | | | | | | | |
| 1. | HS8251 | Technical English | HS | 4 | 4 | 0 | 0 | 4 |
| 2. | MA8251 | Engineering Mathematics - II | BS | 4 | 4 | 0 | 0 | 4 |
| 3. | PH8252 | Physics for Information Science | BS | 3 | 3 | 0 | 0 | 3 |
| 4. | BE8255 | Basic Electrical, Electronics and Measurement Engineering | ES | 3 | 3 | 0 | 0 | 3 |
| 5. | GE8291 | Environmental Science and Engineering | HS | 3 | 3 | 0 | 0 | 3 |
| 6. | CS8251 | Programming in C | PC | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 7. | GE8261 | Engineering Practices Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 8. | CS8261 | C Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| TOTAL | | | | 28 | 20 | 0 | 8 | 24 |

SEMESTER III

| SI.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|---|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | MA8351 | Discrete Mathematics | BS | 4 | 4 | 0 | 0 | 4 |
| 2. | CS8351 | Digital Principles and System Design | ES | 4 | 4 | 0 | 0 | 4 |
| 3. | CS8391 | Data Structures | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8392 | Object Oriented Programming | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | EC8395 | Communication Engineering | ES | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 6. | CS8381 | Data Structures Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 7. | CS8383 | Object Oriented Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 8. | CS8382 | Digital Systems Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 9. | HS8381 | Interpersonal Skills/Listening & Speaking | EEC | 2 | 0 | 0 | 2 | 1 |
| TOTAL | | | | 31 | 17 | 0 | 14 | 24 |

SEMESTER IV

| SI. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|--|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | MA8402 | Probability and Queueing Theory | BS | 4 | 4 | 0 | 0 | 4 |
| 2. | CS8491 | Computer Architecture | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8492 | Database Management Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8451 | Design and Analysis of Algorithms | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8493 | Operating Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | CS8494 | Software Engineering | PC | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 7. | CS8481 | Database Management Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 8. | CS8461 | Operating Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | HS8461 | Advanced Reading and Writing | EEC | 2 | 0 | 0 | 2 | 1 |
| TOTAL | | | | 29 | 19 | 0 | 10 | 24 |

SEMESTER V

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|---|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | MA8551 | Algebra and Number Theory | BS | 4 | 4 | 0 | 0 | 4 |
| 2. | CS8591 | Computer Networks | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | EC8691 | Microprocessors and Microcontrollers | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8501 | Theory of Computation | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8592 | Object Oriented Analysis and Design | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | | Open Elective I | OE | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 7. | EC8681 | Microprocessors and Microcontrollers Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 8. | CS8582 | Object Oriented Analysis and Design Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | CS8581 | Networks Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| TOTAL | | | | 31 | 19 | 0 | 12 | 25 |

SEMESTER VI

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|---|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | CS8651 | Internet Programming | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8691 | Artificial Intelligence | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8601 | Mobile Computing | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8602 | Compiler Design | PC | 5 | 3 | 0 | 2 | 4 |
| 5. | CS8603 | Distributed Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | | Professional Elective I | PE | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 7. | CS8661 | Internet Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 8. | CS8662 | Mobile Application Development Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | CS8611 | Mini Project | EEC | 2 | 0 | 0 | 2 | 1 |
| 10. | HS8581 | Professional Communication | EEC | 2 | 0 | 0 | 2 | 1 |
| TOTAL | | | | 32 | 18 | 0 | 14 | 25 |

SEMESTER VII

| SI. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|-----------------------------------|----------|-----------------|-----------|----------|----------|-----------|
| THEORY | | | | | | | | |
| 1. | MG8591 | Principles of Management | HS | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8792 | Cryptography and Network Security | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8791 | Cloud Computing | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | | Open Elective II | OE | 3 | 3 | 0 | 0 | 3 |
| 5. | | Professional Elective II | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | | Professional Elective III | PE | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 7. | CS8711 | Cloud Computing Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 8. | IT8761 | Security Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| TOTAL | | | | 26 | 18 | 0 | 8 | 22 |

SEMESTER VIII

| SI. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|--------------------------|----------|-----------------|----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | | Professional Elective IV | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | | Professional Elective V | PE | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 3. | CS8811 | Project Work | EEC | 20 | 0 | 0 | 20 | 10 |
| TOTAL | | | | 26 | 6 | 0 | 20 | 16 |

TOTAL NO. OF CREDITS: 185

HUMANITIES AND SOCIAL SCIENCES (HS)

| SI. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|---------------------------------------|----------|-----------------|---|---|---|---|
| 1. | HS8151 | Communicative English | HS | 4 | 4 | 0 | 0 | 4 |
| 2. | HS8251 | Technical English | HS | 4 | 4 | 0 | 0 | 4 |
| 3. | GE8291 | Environmental Science and Engineering | HS | 3 | 3 | 0 | 0 | 3 |
| 4. | MG8591 | Principles of Management | HS | 3 | 3 | 0 | 0 | 3 |

BASIC SCIENCES (BS)

| SI. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|----------------------------------|----------|-----------------|---|---|---|---|
| 1. | MA8151 | Engineering Mathematics I | BS | 4 | 4 | 0 | 0 | 4 |
| 2. | PH8151 | Engineering Physics | BS | 3 | 3 | 0 | 0 | 3 |
| 3. | CY8151 | Engineering Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 4. | BS8161 | Physics and Chemistry Laboratory | BS | 4 | 0 | 0 | 4 | 2 |
| 5. | MA8251 | Engineering Mathematics II | BS | 4 | 4 | 0 | 0 | 4 |
| 6. | PH8252 | Physics for Information Science | BS | 3 | 3 | 0 | 0 | 3 |
| 7. | MA8351 | Discrete Mathematics | BS | 4 | 4 | 0 | 0 | 4 |
| 8. | MA8402 | Probability and Queueing Theory | BS | 4 | 4 | 0 | 0 | 4 |
| 9. | MA8551 | Algebra and Number Theory | BS | 4 | 4 | 0 | 0 | 4 |

ENGINEERING SCIENCES (ES)

| SI. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|---|----------|-----------------|---|---|---|---|
| 1. | GE8151 | Problem Solving and Python Programming | ES | 3 | 3 | 0 | 0 | 3 |
| 2. | GE8152 | Engineering Graphics | ES | 6 | 2 | 0 | 4 | 4 |
| 3. | GE8161 | Problem Solving and Python Programming Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 4. | BE8255 | Basic Electrical, Electronics and Measurement Engineering | ES | 3 | 3 | 0 | 0 | 3 |
| 5. | GE8261 | Engineering Practices Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 6. | CS8351 | Digital Principles and System Design | ES | 4 | 4 | 0 | 0 | 4 |
| 7. | EC8395 | Communication Engineering | ES | 3 | 3 | 0 | 0 | 3 |
| 8. | CS8382 | Digital Systems Laboratory | ES | 4 | 0 | 0 | 4 | 2 |

PROFESSIONAL CORE (PC)

| SI. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|---|----------|-----------------|---|---|---|---|
| 1. | CS8251 | Programming in C | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8261 | C Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 3. | CS8391 | Data Structures | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8392 | Object Oriented Programming | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8381 | Data Structures Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 6. | CS8383 | Object Oriented Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 7. | CS8491 | Computer Architecture | PC | 3 | 3 | 0 | 0 | 3 |
| 8. | CS8492 | Database Management Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 9. | CS8451 | Design and Analysis of Algorithms | PC | 3 | 3 | 0 | 0 | 3 |
| 10. | CS8493 | Operating Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 11. | CS8494 | Software Engineering | PC | 3 | 3 | 0 | 0 | 3 |
| 12. | CS8481 | Database Management Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 13. | CS8461 | Operating Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 14. | CS8591 | Computer Networks | PC | 3 | 3 | 0 | 0 | 3 |
| 15. | EC8691 | Microprocessors and Microcontrollers | PC | 3 | 3 | 0 | 0 | 3 |
| 16. | CS8501 | Theory of Computation | PC | 3 | 3 | 0 | 0 | 3 |
| 17. | CS8592 | Object Oriented Analysis and Design | PC | 3 | 3 | 0 | 0 | 3 |
| 18. | EC8681 | Microprocessors and Microcontrollers Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 19. | CS8582 | Object Oriented Analysis and Design Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 20. | CS8581 | Networks Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 21. | CS8651 | Internet Programming | PC | 3 | 3 | 0 | 0 | 3 |
| 22. | CS8691 | Artificial Intelligence | PC | 3 | 3 | 0 | 0 | 3 |
| 23. | CS8601 | Mobile Computing | PC | 3 | 3 | 0 | 0 | 3 |
| 24. | CS8602 | Compiler Design | PC | 5 | 3 | 0 | 2 | 4 |
| 25. | CS8603 | Distributed Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 26. | CS8661 | Internet Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 27. | CS8662 | Mobile Application Development Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 28. | CS8792 | Cryptography and Network Security | PC | 3 | 3 | 0 | 0 | 3 |
| 29. | CS8791 | Cloud Computing | PC | 3 | 3 | 0 | 0 | 3 |
| 30. | CS8711 | Cloud Computing Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 31. | IT8761 | Security Laboratory | PC | 4 | 0 | 0 | 4 | 2 |

PROFESSIONAL ELECTIVES (PE)**SEMESTER VI
ELECTIVE - I**

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|----------------------------------|----------|-----------------|---|---|---|---|
| 1. | CS8075 | Data Warehousing and Data Mining | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | IT8076 | Software Testing | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | IT8072 | Embedded Systems | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8072 | Agile Methodologies | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8077 | Graph Theory and Applications- | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | IT8071 | Digital Signal Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8075 | Intellectual Property Rights | PE | 3 | 3 | 0 | 0 | 3 |

**SEMESTER VII
ELECTIVE - II**

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|----------------------------------|----------|-----------------|---|---|---|---|
| 1. | CS8091 | Big Data Analytics | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8082 | Machine Learning Techniques | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8092 | Computer Graphics and Multimedia | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | IT8075 | Software Project Management | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8081 | Internet of Things | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | IT8074 | Service Oriented Architecture | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8077 | Total Quality Management | PE | 3 | 3 | 0 | 0 | 3 |

**SEMESTER VII
ELECTIVE - III**

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|---|----------|-----------------|---|---|---|---|
| 1. | CS8083 | Multi-core Architectures and Programming | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8079 | Human Computer Interaction | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8073 | C# and .Net Programming | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8088 | Wireless Adhoc and Sensor Networks | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8071 | Advanced Topics on Databases | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | GE8072 | Foundation Skills in Integrated Product Development | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8074 | Human Rights | PE | 3 | 3 | 0 | 0 | 3 |
| 8. | GE8071 | Disaster Management | PE | 3 | 3 | 0 | 0 | 3 |

**SEMESTER VIII
ELECTIVE - IV**

| SI. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|------------------------------------|----------|-----------------|---|---|---|---|
| 1. | EC8093 | Digital Image Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8085 | Social Network Analysis | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | IT8073 | Information Security | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8087 | Software Defined Networks | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8074 | Cyber Forensics | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | CS8086 | Soft Computing | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8076 | Professional Ethics in Engineering | PE | 3 | 3 | 0 | 0 | 3 |

**SEMESTER VIII
ELECTIVE - V**

| SI. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|----------------------------------|----------|-----------------|---|---|---|---|
| 1. | CS8080 | Information Retrieval Techniques | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8078 | Green Computing | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8076 | GPU Architecture and Programming | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8084 | Natural Language Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8001 | Parallel Algorithms | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | IT8077 | Speech Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8073 | Fundamentals of Nano Science | PE | 3 | 3 | 0 | 0 | 3 |

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

| SI. NO | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|---|----------|-----------------|---|---|----|----|
| 1. | HS8381 | Interpersonal Skills/Listening & Speaking | EEC | 2 | 0 | 0 | 2 | 1 |
| 2. | HS8461 | Advanced Reading and Writing | EEC | 2 | 0 | 0 | 2 | 1 |
| 3. | CS8611 | Mini Project | EEC | 2 | 0 | 0 | 2 | 1 |
| 4. | HS8581 | Professional Communication | EEC | 2 | 0 | 0 | 2 | 1 |
| 5. | CS8811 | Project Work | EEC | 20 | 0 | 0 | 20 | 10 |

CS8811

PROJECT WORK

L T P C

0 0 20 10

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

- On Completion of the project work students will be in a position to take up anychallenging practical problems and find solution by formulating proper methodology.

HS8581

PROFESSIONAL COMMUNICATION

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

OBJECTIVES:

The course aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employable Graduates
- Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

77

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic — questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

Recommended Software

1. Globearena
2. Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
4. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

B.E. COMPUTER SCIENCE AND ENGINEERING

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(III & IV)

VISION:

To make the Department of Computer Science and Engineering the unique of its kind in the field of Research and Development activities in this part of world.

MISSION:

To impart highly innovative and technical knowledge to the urban and unreachable rural student folks in Computer Science and Engineering through "Total Quality Education".

PROGRAM EDUCATIONAL OBJECTIVES:

PEO 1:

Apply the necessary mathematical tools and fundamental knowledge of computer science & engineering to solve variety of engineering problems.

PEO 2:

Develop software based solutions for real life problems and be leaders in their profession with social and ethical responsibilities.

PEO 3:

Pursue life-long learning and research in selected fields of computer science & engineering and contribute to the growth of those fields and society at large.

PROGRAM OUTCOMES:

After going through the four years of study, the Computer Science and Engineering graduates will have the ability to

| | Graduate Attribute | Programme Outcome |
|---|--|--|
| 1 | Engineering knowledge | Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| 2 | Problem analysis | Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| 3 | Design/development of solutions | Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| 4 | Conduct investigations of complex problems | Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions |
| 5 | Modern tool usage | Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations |
| 6 | The engineer and society | Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| 7 | Environment and sustainability | Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |

| | | |
|----|--------------------------------|--|
| 8 | Ethics | Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| 9 | Individual and team work | Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 10 | Communication | Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| 11 | Project management and finance | Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| 12 | Life-long learning | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1 :

Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2:

Problem - Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

B.E. COMPUTER SCIENCE AND ENGINEERING

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(III & IV)

SEMESTER III

| SI. No. | COURSE CODE | COURSE TITLE | CATEGORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|------------------|-------------|--|----------|------------------|----------|-----------|-----------------------|-----------|
| | | | | L | T | P | | |
| THEORY | | | | | | | | |
| 1 | MA1371 | Multivariate Calculus and Linear Algebra | BS | 3 | 1 | 0 | 4 | 4 |
| 2 | CS1301 | Data Structures using Python | PC | 3 | 0 | 0 | 3 | 3 |
| 3 | CS1371 | Database Management Systems | PC | 3 | 0 | 0 | 3 | 3 |
| 4 | CS1372 | System Programming and Operating Systems | PC | 3 | 0 | 0 | 3 | 3 |
| 5 | EC1372 | Digital System Design and Microprocessors | ES | 3 | 0 | 0 | 3 | 3 |
| PRACTICAL | | | | | | | | |
| 6 | CS1311 | Data Structures Laboratory using Python | PC | 0 | 0 | 4 | 4 | 2 |
| 7 | CS1381 | Database Management Systems Laboratory | PC | 0 | 0 | 4 | 4 | 2 |
| 8 | EC1381 | Digital System Design and Microprocessors Laboratory | ES | 0 | 0 | 4 | 4 | 2 |
| 9 | HS1321 | Interpersonal Skills - Listening and Speaking | EEC | 0 | 0 | 2 | 2 | 1 |
| TOTAL | | | | 15 | 1 | 14 | 30 | 23 |

SEMESTER IV

| Sl. No. | COURSE CODE | COURSE TITLE | CATEGORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|------------------|-------------|---|----------|------------------|----------|----------|-----------------------|-----------|
| | | | | L | T | P | | |
| THEORY | | | | | | | | |
| 1 | MA1473 | Probability and Statistics | BS | 3 | 1 | 0 | 4 | 4 |
| 2 | CS1401 | Analysis of Algorithms | PC | 3 | 0 | 2 | 5 | 4 |
| 3 | CS1402 | Software Engineering with UML Design | PC | 3 | 0 | 0 | 3 | 3 |
| 4 | IT1371 | Computer Organization and Architecture | PC | 3 | 0 | 0 | 3 | 3 |
| 5 | AD1372 | Introduction to Artificial Intelligence | PC | 3 | 0 | 0 | 3 | 3 |
| 6 | GE1471 | Professional Ethics and Human Values | HS | 3 | 0 | 0 | 3 | 3 |
| PRACTICAL | | | | | | | | |
| 7 | CS1411 | CASE Tools Laboratory | PC | 0 | 0 | 4 | 4 | 2 |
| 8 | HS1421 | An Introduction to Advanced Reading and Writing | EEC | 0 | 0 | 2 | 2 | 1 |
| TOTAL | | | | 18 | 1 | 8 | 27 | 23 |

Inner products spaces – Orthogonal vectors- Gram Schmidt orthogonalization process - Orthogonal complement – Least square approximation - Minimal solution to system of linear equations

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- CO1 Apply the concepts of partial derivatives to find the higher derivatives of multi variable functions.
- CO2 Apply the techniques of multi variable calculus to compute the gradients, directional derivative and extreme values
- CO3 Test the given system of equation is linearly dependent or independent.
- CO4 Apply the concept of eigen values and eigenvectors for Diagonalization of a matrix
- CO5 Apply the inner product techniques for finding the orthonormal vector and minimal solution to the system of linear equation

TEXT BOOKS:

1. Thomas', Weir & Hass, 2018, *Calculus*, 13th ed, Pearson.
2. Friedberg, AH, Insel, AJ & Spence, L, 2004, *Linear Algebra*, Prentice Hall of India, New Delhi.

REFERENCES:

1. James Stewart, 2007, *Calculus* (Early transcendentals), Brooks cole.
2. Peter D Lax & Maria shea Terrell, 2018, *Multi variable Calculus with applications*, 6th ed, Springer.
3. Kolman, B & Hill, DR, 2009, *Introductory Linear Algebra*, 1st Reprint, Pearson Education, New Delhi.
4. Kumaresan, S, 2010, *Linear Algebra - A Geometric Approach*, Prentice Hall of India, New Delhi, Reprint.
5. Strang, G, 2005, *Linear Algebra and its applications*, Thomson (Brooks/Cole), New Delhi.

UNIT V SEARCHING, SORTING & HASHING TECHNIQUES**9**

Searching - Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort - Quick sort - Heap Sort - Merge Sort -comparison of sorting algorithms - Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL : 45 PERIODS**COURSE OUTCOMES:**

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

- CO1 Explain about the basic concepts of linear data structures.
- CO2 Outline the usage of linear data structures like stacks and queues in program design
- CO3 Infer knowledge about tree data structure and its applications.
- CO4 Summarize about different graph traversal methods and applications of graphs.
- CO5 Make use of appropriate searching, sorting and hashing techniques for solving a problem

TEXT BOOKS:

1. Rance D Necaie, *Data Structures and Algorithms using Python*, Wiley Student Edition.
2. Benjamin Baka, David Julian, 2017, *Python Data Structures and Algorithms*, Packt Publishers.

REFERENCES:

1. Lipschutz, S, 2008, *Data Structures*, 1st ed, Tata McGraw Hill Education.
2. Samanta, D, 2004, *Classic Data Structures*, 2nd ed, PHI Learning.

CS1371 DATABASE MANAGEMENT SYSTEMS

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

OBJECTIVES:

To enable the students to

- Learn the fundamentals of data models and to represent a database system using ER diagrams.
- Study SQL and relational database design.
- Understand the internal storage structures using different file and indexing techniques which will help in physical DB design.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- CO1 Infer the basic concepts of database system and model ER diagram for real time applications
- CO2 Use appropriate SQL commands to store and access data from Relational Database
- CO3 Construct normalized database for real world scenario using functional dependencies.
- CO4 Illustrate the importance of transaction and concurrency control to maintain consistency in a database.
- CO5 Interpret the mechanism incorporated in file organization and Query Processing.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F Korth, Sudharshan, S, 2017, *Database System Concepts*, 6th ed, Tata McGraw Hill.
2. Ramez Elmasri, Shamkant B Navathe, 2011, *Fundamentals of Database Systems*, 6th ed, Pearson Education.

REFERENCES:

1. Date, CJ, Kannan, A & Swamynathan, S, 2006, *An Introduction to Database Systems*, 8th ed, Pearson Education.
2. Raghu Ramakrishnan, 2015, *Database Management Systems*, 4th ed, McGraw-Hill College Publications.
3. G.K.Gupta, 2011, *Database Management Systems*, Tata McGraw Hill.

CS1372 SYSTEM PROGRAMMING AND OPERATING SYSTEMS

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

OBJECTIVES:

To enable the students to

- Understand the basic concepts about system software.
- Know about processes and threads.
- Familiarize with the scheduling algorithms and deadlock handling mechanisms.
- Implement various memory management schemes.
- Explain about file systems.

COURSE OUTCOMES:

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

- CO1 Explain different types of system software and its use
- CO2 Illustrate the concepts of process, threads and CPU scheduling algorithms
- CO3 Explain the algorithms used for concurrency and deadlock handling.
- CO4 Make use of various memory management schemes
- CO5 Demonstrate the concept of file systems.

TEXT BOOKS:

1. Leland L Beck, 1997, *System Software: An Introduction to Systems Programming*, 3rd ed, Pearson Education Asia.
2. Abraham Silberschatz, Peter Baer Galvin & Greg Gagne, 2018, *Operating System Concepts*, 9th ed, John Wiley and Sons Inc.

REFERENCES:

1. Andrew S Tanenbaum, 2004, *Modern Operating Systems*, 2nd ed, Pearson Education.
2. Elmasri, R, Carrick, A & Levine, D, 2010, *Operating Systems – A Spiral Approach*, Tata McGraw Hill Edition.
3. Achyut S Godbole & Atul Kahate, 2016, *Operating Systems*, McGraw Hill Education.
4. Gary Nutt, 2004, *Operating Systems*, 3rd ed, Pearson Education.
5. Harvey M Deitel, 2004, *Operating Systems*, 3rd ed, Pearson Education.
6. Daniel P Bovet & Marco Cesati, 2005, *Understanding the Linux kernel*, 3rd ed, O'Reilly.
7. Neil Smyth, 2011, *iPhone iOS 4 Development Essentials – Xcode*, 4th ed, Payload media.

EC1372 DIGITAL SYSTEM DESIGN AND MICROPROCESSORS

OBJECTIVES:

To enable the students to

- Understand the concepts of Boolean functions and minimization techniques.
- Summarize the combinational circuits used to perform basic digital operations.

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

COURSE OUTCOMES:

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

- CO1 Outline the Boolean functions and various minimization techniques.
- CO2 Illustrate the combinational circuits used to perform basic digital operations
- CO3 Develop a synchronous/asynchronous counters and shift registers using sequential logic.
- CO4 Make use of 8086 processor architecture, addressing mode and instruction set to develop Assembly Language Programming
- CO5 Explain interfacing of I/O devices with 8086 processor.

TEXT BOOKS:

1. Morris Mano, M & Michael D Ciletti, 2017, *Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog*, 6th ed, Pearson Education.
2. Nagoor Kani, A, 2017, *Microprocessors and Microcontrollers*, McGraw hill, 2017 edition.
3. Charles H Roth, 2013, *Fundamentals of Logic Design*, 6th ed, Thomson Learning.

REFERENCES:

1. Wakerly JF, 2002, *Digital Design: Principles and Practices*, 2nd Ed, Prentice-Hall.
2. Givone, DD, 2003, *Digital Principles and Design*, Tata Mc-Graw Hill, New Delhi.
3. Thomas L Floyd, 2011, *Digital Fundamentals*, 10th ed, Pearson Education Inc.
4. Stephen Brown & Zvonko Vranesic, 2013, *Fundamentals of Digital Logic with Verilog Design*, 3rd ed, McGraw-Hill Higher Education, New Delhi, India.

CS1311 DATA STRUCTURES LABORATORY USING PYTHON

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

OBJECTIVES:

To enable the students to

- Understand the basic concepts of linear data structures.
- Gain knowledge about different non-linear data structures and its applications.
- Gain knowledge about different variants of tree structures.
- Be familiar with graph traversal methods and application of graphs.
- Be familiar with different searching, sorting and hashing techniques.

List of Experiments:

1. Basics of Python.
2. Array implementation of Stack and Queue ADTs.
3. Implementation of singly linked list.
4. Linked list implementation of Stack and Queue ADTs.
5. Applications of List ADT.
6. Applications of Stack and Queue ADTs.
7. Implementation of Binary Trees and operations of Binary Trees
8. Implementation of Binary Search Trees.
9. Implementation of AVL Trees.
10. Implementation of Heaps.
11. Graph representation, Traversal algorithms.
12. Applications of Graphs.
13. Implementation of searching and sorting algorithms.
14. Implementation of hashing with collision resolution techniques.

TOTAL: 60 PERIODS**COURSE OUTCOMES:**

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

- CO1 Develop programs to perform operations using stack and queues data structures
- CO2 Apply the concepts of linked lists to solve a problem
- CO3 Apply the appropriate non-linear data structure for solving the problem.
- CO4 Make use of different searching and sorting algorithms
- CO5 Build appropriate hash functions that result in a collision free scenario for data storage and retrieval

LIST OF LAB EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

| SI.No | Description of Equipment | Quantity Required |
|-------|--|-------------------|
| 1. | Personal Computers (Intel Core i3, 500 GB, 4 GB RAM) | 30 |
| 2. | Printer | 1 |
| 3. | Software: Anaconda IDE | 30 |
| 4. | Interpreter: Python3 | 30 users |

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

OBJECTIVES:

To enable the students to:

- Learn the commands for creating and manipulating the databases.
- Construct queries for retrieval of required data from database.
- Understand views, sequences and synonyms concepts of SQL.
- Learn the functions, procedures, triggers and exception handling in SQL.
- Develop GUI based application for storage and retrieval of data

LIST OF EXPERIMENTS:

- 1. WRITE AND EXECUTE SIMPLE QUERIES USING SQL**
 - a. DDL, TCL and DCL commands
 - b. DML commands
 - c. Aggregate Functions
- 2. WRITE AND EXECUTE ADVANCED QUERIES USING SQL**
 - a. Nested Queries and Sub queries
 - b. SQL Join
- 3. WRITE AND EXECUTE VIEWS, SYNONYMS, SEQUENCE**
- 4. WRITE AND EXECUTE QUERIES USING PL/SQL**
 - a. Simple programs
- 5. WRITE AND EXECUTE QUERIES USING ADVANCED CONCEPTS OF PL/SQL**
 - a. Cursors and Procedures
 - b. Functions
 - c. Triggers
 - d. Exception Handling
- 6. IMPLEMENT DATABASE CONNECTIVITY CONCEPTS**
 - a. Design a Front End for a real time application
 - b. Connect the database with the application
- 7. MINI PROJECT**

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- CO1 Choose appropriate DDL, DML, DCL and TCL commands for creating and manipulating the databases
- CO2 Construct appropriate nested queries, sub queries and join queries for efficient retrieval of data
- CO3 Organize database using views, sequences, and synonyms
- CO4 Implement functions, procedures, triggers and exceptions using PL/SQL
- CO5 Develop a GUI based environment for storage and retrieval of data for a real time application

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

| S. No. | Description of Equipment | Quantity Required |
|--------|---|-------------------|
| 1. | Personal Computers (Intel Core i3, HDD 500 GB, 4 GB RAM) | 30 |
| 2. | Printer | 1 |
| 3. | Software: XAMPP with Apache, MySQL & PHP (or) MySQL & JAVA. | Open source |

EC1381

DIGITAL SYSTEM DESIGN AND MICROPROCESSORS LABORATORY

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

OBJECTIVES:

To enable the students to

- Design and implement the various combinational circuits.
- Design and implement combinational circuits using MSI devices.
- Design and implement sequential circuits.
- Implement and simulate 8086 programs in 8086 kit and MASM Assembler.
- Implement different I/Os with 8086 microprocessor.

LIST OF EXPERIMENTS:

Digital Experiments:

1. Verification of Boolean Theorems using basic gates

2. Design and implementation of combinational circuits using basic gates for arbitrary functions
3. Design and implementation of Half/Full Adder and Subtractor
4. Design and implementation of Encoder, Decoder, Multiplexer and Demultiplexer using logic gates
5. Design and implementation of Shift register (SISO, SIPO, PIPO) using Flip flops
6. Design and implementation of 2 bit Synchronous counters

Microprocessor Experiments:

8086 Programs using kits and MASM

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic operations

Peripherals and Interfacing Experiments

1. Traffic light control
2. Stepper motor control
3. Keyboard and Display Interface

Mini project

1. Flashing of LEDS using NODE MCU/Arduino
2. Monitoring Temperature using LM35 sensor in NODEMCU/Arduino

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- CO1 Experiment with the basics of gates.
- CO2 Build different combinational circuits
- CO3 Construct various sequential circuits
- CO4 Experiment with 8086 microprocessor based programs.
- CO5 Build different I/Os with 8086 microprocessor

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

| S. No. | Description of Equipment | Quantity Required |
|---------------|---------------------------------|--------------------------|
| 1. | Digital trainer kits | 15 |
| 2. | Digital ICs | 50 |

| | | |
|----|--|----|
| 3. | 8086 Microprocessor trainer kit with power supply | 15 |
| 4. | Traffic light control interfacing card compatible with 8086 | 5 |
| 5. | Stepper motor control interfacing compatible with 8086 | 5 |
| 6. | Keyboard & Display interface board compatible with 8086 kits | 5 |

HS1321 INTERPERSONAL SKILLS - LISTENING AND SPEAKING

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

OBJECTIVES:

The course will enable learners to

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills
- Make effective presentations

UNIT I LISTENING AS A KEY SKILL

6

Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification - Improving pronunciation– pronunciation basics — stressing syllables and speaking clearly – intonation patterns – conversation starters: small talk.

UNIT II LISTEN TO A PROCESS INFORMATION

6

Listen to a process information- give information, as part of a simple explanation — taking lecture notes – preparing to listen to a lecture – articulate a complete idea as opposed to producing fragmented utterances - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics

UNIT III LEXICAL CHUNKING

6

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk – greet – respond to greetings – describe health and symptoms – invite and offer – accept – decline – take leave – listen for and follow the gist- listen for detail

UNIT IV GROUP DISCUSSION**6**

Being an active listener: giving verbal and non-verbal feedback – participating in a group discussion – summarizing academic readings and lectures conversational speech listening to and participating in conversations – persuade- negotiate disagreement in group work.

UNIT V GROUP & PAIR PRESENTATIONS**6**

Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations

TOTAL: 30 PERIODS**COURSE OUTCOMES:**

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

- CO1 Develop their communicative competence in English with specific reference to listening
- CO2 Prepare conversation with reasonable accuracy
- CO3 Apply lexical Chunking for accuracy in speaking
- CO4 Demonstrate their ability to communicate effectively in GDs.
- CO5 Explain directions and instructions in academic and business contexts

TEXT BOOKS:

1. Brooks, Margret, 2011, *Skills for Success. Listening and Speaking. Level 4*, Oxford University Press, Oxford.
2. Richards, C, Jack & David Bholke, 2010, *Speak Now Level 3*, Oxford University Press, Oxford.

REFERENCES:

1. Bhatnagar, Nitin & Mamta Bhatnagar, 2010, *Communicative English for Engineers and Professionals*, Pearson, New Delhi.
2. Hughes, Glyn & Josephine Moate, 2014, *Practical English Classroom*, Oxford University Press, Oxford.
3. Vargo, Mari, 2013, *Speak Now Level 4*, Oxford University Press, Oxford.
4. Richards, C, Jack, 2006, *Person to Person (Starter)*, Oxford University Press, Oxford.
5. Ladousse, Gillian Porter, 2014, *Role Play*. Oxford University Press, Oxford.

WEB RESOURCES:

1. <https://www.cambridge.org/elt/blog/wp-content/uploads/2019/10/Learning-Language-in-Chunks.pdf>
2. <https://english.eagetutor.com/english/628-how-to-greet-your-boss-people-in-office.html>
3. <https://www.groupdiscussionideas.com/group-discussion-topics-with-answers/>
4. <https://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit3presentations/1opening.shtml>

SEMESTER IV

MA1473

PROBABILITY AND STATISTICS

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

OBJECTIVES:

To enable the students to

- Introduce the basics of random variables and some standard distributions that can describe real life phenomenon.
- Establish the basic concepts of two-dimensional random variables.
- Impart the knowledge of testing of hypothesis for small and large samples.
- Describe the basic principles in the design of simple experiments for comparing pairs of treatments.
- Introduce the basic concepts of statistical quality control that plays a vital role in the field of Engineering and Technology.

UNIT I PROBABILITY AND RANDOM VARIABLES

12

Probability – The axioms of probability – Conditional probability – Baye’s theorem – Discrete and continuous random variables – Moments – Moment generating functions – Distributions: Binomial, Poisson, Uniform, Exponential and Normal.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES

12

Joint distributions – marginal and conditional distributions –covariance – correlation – Karl Pearson’s correlation coefficient – Rank correlation – Spearman’s rank correlation coefficient – Kendall’s rank correlation coefficient - linear regression.

UNIT III TESTING OF HYPOTHESIS 12

Sampling distributions – Statistical Hypothesis – Type I and Type II errors – Tests for single mean and difference of means of large samples (z-test) and Small samples (t-test) – F-test for variance – chi-square test for goodness of fit – independence of attributes – Demo using Excel.

UNIT IV DESIGN OF EXPERIMENTS 12

Basic Principles of experimental design – Completely randomized design – Randomized block design – Latin square design – 2 level factorial design – Demo using Excel.

UNIT V STATISTICAL QUALITY CONTROL 12

Control charts for measurements (\bar{X} and R charts for continuous data) – control charts for attributes (p, c, np and u charts for discrete data) – tolerance limits – Demo using Excel.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- CO1 Solve various problems using random variables and distributions
- CO2 Compute the correlation between two variables and linear regression equation for a set of data
- CO3 Apply the concepts of testing of hypothesis for small and large samples in real life problems
- CO4 Interpret the data using ANOVA and basic experimental design.
- CO5 Apply the techniques of Statistical quality control in industrial Engineering problems

TEXT BOOKS:

- 1 Devore, J.L., 2017. *Probability and Statistics for Engineering and the Sciences*. Boston, Cengage Learning.
- 2 Johnson, R.A. and Gupta, C.B., 2017. *Miller and Freund's Probability and Statistics for Engineers*. New Delhi, Pearson India Education.

REFERENCES:

- 1 Milton, J.S. and Arnold, J.C., 2008. *Introduction to Probability and Statistics*. New Delhi, Tata McGraw Hill.

- 2 Ross, S.M., 2014. *Introduction to Probability and Statistics for Engineers and Scientists*. New Delhi, Elsevier.
- 3 Spiegel, M.R., Schiller, J., Srinivasan, R.A. and Goswami, D., 2017. *Introduction to Probability and Statistics for Engineers and Scientists*. New Delhi, Elsevier.
- 4 Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., 2007. *Probability and Statistics for Engineers and Scientists*. Asia, Pearson Education.
- 5 Gupta, S.C. and Kapoor, V.K., 2020. *Fundamentals of Mathematical Statistics*. Sultan Chand & Sons.

CS1401 ANALYSIS OF ALGORITHMS

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

OBJECTIVES:

To enable the students to

- Apply the knowledge of computing and mathematics to algorithm design
- Explain Brute force and Divide-and-Conquer techniques
- Identify the algorithm efficiency for Greedy and Dynamic programming techniques
- Be familiar with Iterative improvement techniques
- Understand the limitations of Algorithm power

UNIT I INTRODUCTION 9

Notion of an Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types - Performance analysis - space and time complexity - Growth of function – Big-Oh, Omega, theta notation - Asymptotic Notations and its properties-Recurrent equations and the master theorem - Empirical Analysis - Mathematical analysis for Recursive and Non-recursive algorithms - Visualization

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force – String Matching - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman-Problem - Knapsack Problem - Assignment problem-Divide and conquer methodology – Merge sort – Quick sort – Randomized version of quick sort and analysis – Heap Sort - Binary search – Strassen’s matrix multiplication - Closest pair and Convex hull problems

| | | |
|----|----------------------|-------------|
| 2. | Printer | 1 |
| 3. | Software: Python 3.6 | Open source |

TOTAL : 75 PERIODS

COURSE OUTCOMES:

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

- CO1 Identify the time and space complexity of computational problems
- CO2 Make use of Bruteforce and Divide and Conquer techniques for sorting and searching Problems
- CO3 Apply Greedy and Dynamic Programming techniques for Graph and Combinatorial Problems
- CO4 Identify the roles of iterative improvement technique to solve optimization problems.
- CO5 Explain the use of Backtracking, Branch & Bound and approximation techniques to overcome the limitations of NP-Complete and NP-Hard Problems

TEXT BOOKS:

1. Anany Levitin, 2012, *Introduction to the Design and Analysis of Algorithms*, 3rd ed, Pearson Education.
2. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, 2007, *Computer Algorithms/ C++*, 2nd ed, Universities Press.

REFERENCES:

1. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest & Clifford Stein, 2012, *Introduction to Algorithms*, 3rd ed, PHI Learning Private Limited.
2. Alfred V Aho, John E Hopcroft & Jeffrey D Ullman, 2006, *Data Structures and Algorithms*, Pearson Education, Reprint.

CS1402 SOFTWARE ENGINEERING WITH UML DESIGN

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

OBJECTIVES:

To enable the students to

- Learn the fundamental concepts of software process and requirements engineering
- Explore UML static modeling

- Explore UML dynamic modeling
- Learn the various management concepts
- Understand the different testing strategies

UNIT I SOFTWARE PROCESS AND REQUIRMENTS ENGINEERING 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process-Requirements Engineering- Functional and non-functional requirements- The software requirements document-Requirements specification- Requirements engineering processes- Requirements elicitation and analysis- Requirements validation- Requirements management

UNIT II STATIC MODELING 9

Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class hierarchies - Aggregation and Composition - UML activity diagrams and modeling

UNIT III DYNAMIC MODELING AND IMPLEMENTATION 9

System sequence diagrams – Communication diagrams - Relationship between sequence diagrams and use cases - Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams – relationship – inheritance – Abstract classes –Operation contracts - Mapping design to code – Test driven development – Refactoring – UML tools and UML as blueprint - UML state machine diagrams and modeling - UML deployment and component diagrams – Designing for visibility - Adopting Agile modeling on an UP project

UNIT IV DESIGN AND MANAGEMENT CONCEPTS 9

Design Process-Design Concepts-Design Model-Software Configuration Management-The SCM Repository-The SCM process – Project Management Concepts: The management Spectrum-People-The Product-The process- The Project-Project Scheduling-Risk Management

UNIT V SOFTWARE TESTING STRATEGIES 9

Test Strategies for Conventional Software-Validation Testing-System Testing- Testing Conventional Applications: White-Box Testing - Basis Path Testing-Control Structure Testing - Black box testing: Equivalence Partitioning-Boundary Value Analysis

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- CO1 Develop life cycle models for software development
- CO2 Model the static features of a system.
- CO3 Model the dynamic features of a system.
- CO4 Illustrate the different management techniques.
- CO5 Demonstrate the various testing methodologies.

TEXT BOOKS:

1. Roger S Pressman, 2014, *Software Engineering: A practitioner's Approach*, 7th ed, McGraw-Hill International Edition.
2. Craig Larman, 2015, *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design*, 3rd ed, Pearson Publishers.

REFERENCES:

1. Bhuvan Unhelkar, 2018, *Software Engineering with UML*, 1st edition, Auerbach Publications.
2. Martina Seidl, Marion Scholz, Christian Huemer & Gerti Kappel, 2015, *UML @ Classroom: An Introduction to Object-Oriented Modeling*, Springer Verlag.

IT1371 COMPUTER ORGANIZATION AND ARCHITECTURE

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

OBJECTIVES:

To enable the students to

- Understand the basic structure, operations and instructions of a digital computer.
- Learn the implementation of fixed point and floating-point arithmetic operations.
- Be familiar with the basic processing unit and multiple functional units in a processor.
- Understand the hierarchical memory system and I/O organization.
- Learn the concepts of instruction-level parallelism, data-level parallelism and loop-level parallelism.

- CO3 Interpret the role of a processing unit and multiple functional units.
- CO4 Explain the various elements in memory hierarchy and the basic and complex I/O structures.
- CO5 Demonstrate how parallelism is used at instruction-level and data-level parallelism.

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky & Naraig Manjikian, 2012, *Computer Organization and Embedded Systems*, 6th ed, Tata McGraw Hill.

REFERENCES:

1. David A. Patterson & John L. Hennessy, 2014, *Computer Organization and Design: The Hardware/Software Interface*, 5th ed, Morgan Kaufmann / Elsevier.
2. William Stallings, 2010, *Computer Organization and Architecture – Designing for Performance*, 8th ed, Pearson Education.
3. John P. Hayes, 2012, *Computer Architecture and Organization*, 3rd ed, Tata McGraw Hill.

AD1372 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

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

OBJECTIVES:

To enable the students to

- Understand the various characteristics of Intelligent agents
- Learn the different search strategies in Artificial Intelligence
- Be familiar with represent knowledge in solving Artificial Intelligence problems
- Understand the agent communication and Trust and Reputation
- Know about the various applications of Artificial Intelligence.

UNIT I INTRODUCTION

9

Introduction–Definition - The Foundations of Artificial Intelligence- Characteristics of Intelligent Agents -Turing test – Agents and Environments - Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents; Problem Solving Approach to Typical AI problems

TEXTBOOK:

1. Russell, S & Norvig, P, 2020, *Artificial Intelligence: A Modern Approach*, 4th ed, Prentice Hall.

REFERENCES:

1. Elaine Rich & Kevin Knight, 2008, *Artificial Intelligence*, 3rd ed, Tata McGraw-Hill.
2. Tim Jones, M, 2008, *Artificial Intelligence: A Systems Approach (Computer Science)*, 1st ed, Jones and Bartlett Publishers, Inc.
3. Nils J Nilsson, 2009, *The Quest for Artificial Intelligence*, Cambridge University Press.
4. Gerhard Weiss, 2013, *Multi Agent Systems*, 2nd ed, MIT Press.
5. David L Poole & Alan K Mackworth, 2010, *Artificial Intelligence: Foundations of Computational Agents*, Cambridge University Press.

GE1471 PROFESSIONAL ETHICS AND HUMAN VALUES

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

OBJECTIVES:

To enable the students to

- Create an awareness on Engineering Ethics and Human Values.
- Instill Moral and Social Values and
- Impart Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES

10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue –Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time –Cooperation –Commitment – Empathy – Self-confidence – Character – Spirituality – Stress management Techniques.

UNIT II ENGINEERING ETHICS

9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

5. John R Boatright & Jeffery Smith, 2016, *Ethics and the Conduct of Business*, 8th ed, Pearson Education.
6. Edmund G Seebauer & Robert L Barry, 2001, *Fundamentals of Ethics for Scientists and Engineers*, South Asia Edition, Oxford University Press.

CS1411 CASE TOOLS LABORATORY

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

OBJECTIVES:

To enable the students to

- Capture the requirements specification for an intended software system and prepare SRS for a software system.
- Draw the entity relationship diagram and data flow diagram for the application.
- Draw the UML diagrams for the given specification
- Map the design properly to code
- Test the software system thoroughly for any scenarios

LIST OF EXPERIMENTS:

1. Identify the requirements specification for a software system and prepare SRS document for the identified system.
2. Draw the Entity Relationship Diagram and Data Flow Diagram for the selected case study
3. Study the basic concepts and diagrams of UML.
4. Identify use cases and develop the Use Case diagram for a system
5. Identify the conceptual classes and develop a Domain Model for a software system. Draw a Class Diagram for the identified system.
6. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagram.
7. Draw the UML Collaboration Diagram for the identified scenarios.
8. Draw relevant State Chart and Activity Diagrams for the same system.
9. Implement the system as per the detailed design
10. Test the software system for all the scenarios identified as per the use case diagram
11. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
12. Implement the modified system and test it for various scenarios

SUGGESTED TOPICS 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

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- CO1 Identify the requirements specification for a software system and prepare SRS for applications.
- CO2 Construct the entity relationship diagram and data flow diagram for the application.
- CO3 Construct the UML diagrams for the given specification of the software system.
- CO4 Utilize the design and map to code.
- CO5 Experiment with the developed code using test cases.

LIST OF LAB EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

| SI.No | Description of Equipment | Quantity Required |
|--------------|---|--------------------------|
| 1. | Hardware Requirements Personal Computers (Intel Core i3, 500 GB, 4 GB RAM) | 30 |
| 2. | Printer | 1 |
| 3. | SOFTWARE TOOLS | |

| | | |
|--|---|----|
| | Rational Suite 30 user License Open-Source Alternatives: ArgoUML, Visual Paradigm Eclipse IDE and JUnit, PCs | 30 |
|--|---|----|

HS1421 AN INTRODUCTION TO ADVANCED READING AND WRITING

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

OBJECTIVES:

The course will enable learners to

- To strengthen the reading skills of students of engineering.
- To enhance their writing skills with specific reference to technical writing
- To develop their critical thinking skills.
- To provide more opportunities to develop their project and proposal writing skills

UNIT I EFFECTIVE READING 6

Reading – Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title. Reading-Read for details-Use of graphic organizers to review and aid comprehension.

UNIT II CRITICAL READING 6

Reading– Understanding pronoun reference and use of connectors in a passage- speed reading techniques. Reading– Genre and Organization of Ideas- Reading– Critical reading and thinking- understanding how the text positions the reader.

UNIT III PARAGRAPH WRITING 6

Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence.-Write a descriptive paragraph Writing-State reasons and examples to support ideas in writing– Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT IV ESSAY WRITING 6

Writing– Elements of a good essay - Types of essays- descriptive-narrative- issue-based-

argumentative-analytical.

UNIT V EFFECTIVE WRITING

6

Writing– Email writing- visumes – Job application- Report Writing - Project writing-Writing convincing proposals

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- CO1 Understand how the text positions the reader
- CO2 Develop critical thinking while reading a text
- CO3 Develop a descriptive paragraph
- CO4 Make use of sentence structures effectively when creating an essay.
Demonstrate proper usage of grammar in writing E-Mails, Job application and project proposals
- CO5

TEXT BOOKS:

1. Gramer, F, Margot & Colin, S, Ward, 2011, *Reading and Writing (Level 3)* Oxford University Press, Oxford.
2. Debra Daise, CharlNorloff, and Paul Carne, 2011, *Reading and Writing (Level 4)* Oxford University Press: Oxford.

REFERENCE BOOKS:

1. Davis, Jason & Rhonda Llss. 2006 *Effective Academic Writing (Level 3)* Oxford University Press: Oxford.
2. E. Suresh Kumar and et al. 2012, *Enriching Speaking and Writing Skills*, Second Edition, Orient Black swan: Hyderabad.
3. Withrow, Jeans and et al. 2004 *Inspired to Write. Readings and Tasks to develop writing skills*, Cambridge University Press: Cambridge.
4. Goatly, Andrew, 2000 *Critical Reading and Writing*, Routledge: United States of America.
5. Petelin, Roslyn & Marsh Durham, 2004 *The Professional Writing Guide: Knowing Well and Knowing Why*, Business & Professional Publishing: Australia.

WEB RESOURCES:

- <http://learnenglishteens.britishcouncil.org/skills/reading>
- <https://learnenglish.britishcouncil.org/skills/reading>
- <https://www.readingrockets.org/article/25-activities-reading-and-writing-fun>
- <https://linguapress.com/advanced.htm>

| | | |
|----|--|----|
| 3. | 8086 Microprocessor trainer kit with power supply | 15 |
| 4. | Traffic light control interfacing card compatible with 8086 | 5 |
| 5. | Stepper motor control interfacing compatible with 8086 | 5 |
| 6. | Keyboard & Display interface board compatible with 8086 kits | 5 |

HS1321 INTERPERSONAL SKILLS - LISTENING AND SPEAKING

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

OBJECTIVES:

The course will enable learners to

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills
- Make effective presentations

UNIT I LISTENING AS A KEY SKILL

6

Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification - Improving pronunciation– pronunciation basics — stressing syllables and speaking clearly – intonation patterns – conversation starters: small talk.

UNIT II LISTEN TO A PROCESS INFORMATION

6

Listen to a process information- give information, as part of a simple explanation — taking lecture notes – preparing to listen to a lecture – articulate a complete idea as opposed to producing fragmented utterances - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics

UNIT III LEXICAL CHUNKING

6

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk – greet – respond to greetings – describe health and symptoms – invite and offer – accept – decline – take leave – listen for and follow the gist- listen for detail

UNIT IV GROUP DISCUSSION**6**

Being an active listener: giving verbal and non-verbal feedback – participating in a group discussion – summarizing academic readings and lectures conversational speech listening to and participating in conversations – persuade- negotiate disagreement in group work.

UNIT V GROUP & PAIR PRESENTATIONS**6**

Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations

TOTAL: 30 PERIODS**COURSE OUTCOMES:**

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

- CO1 Develop their communicative competence in English with specific reference to listening
- CO2 Prepare conversation with reasonable accuracy
- CO3 Apply lexical Chunking for accuracy in speaking
- CO4 Demonstrate their ability to communicate effectively in GDs.
- CO5 Explain directions and instructions in academic and business contexts

TEXT BOOKS:

1. Brooks, Margret, 2011, *Skills for Success. Listening and Speaking. Level 4*, Oxford University Press, Oxford.
2. Richards, C, Jack & David Bholke, 2010, *Speak Now Level 3*, Oxford University Press, Oxford.

REFERENCES:

1. Bhatnagar, Nitin & Mamta Bhatnagar, 2010, *Communicative English for Engineers and Professionals*, Pearson, New Delhi.
2. Hughes, Glyn & Josephine Moate, 2014, *Practical English Classroom*, Oxford University Press, Oxford.
3. Vargo, Mari, 2013, *Speak Now Level 4*, Oxford University Press, Oxford.
4. Richards, C, Jack, 2006, *Person to Person (Starter)*, Oxford University Press, Oxford.
5. Ladousse, Gillian Porter, 2014, *Role Play*. Oxford University Press, Oxford.

WEB RESOURCES:

1. <https://www.cambridge.org/elt/blog/wp-content/uploads/2019/10/Learning-Language-in-Chunks.pdf>
2. <https://english.eagetutor.com/english/628-how-to-greet-your-boss-people-in-office.html>
3. <https://www.groupdiscussionideas.com/group-discussion-topics-with-answers/>
4. <https://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit3presentations/1opening.shtml>

SEMESTER IV

MA1473

PROBABILITY AND STATISTICS

| L | T | P | C |
|---|---|---|---|
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OBJECTIVES:

To enable the students to

- Introduce the basics of random variables and some standard distributions that can describe real life phenomenon.
- Establish the basic concepts of two-dimensional random variables.
- Impart the knowledge of testing of hypothesis for small and large samples.
- Describe the basic principles in the design of simple experiments for comparing pairs of treatments.
- Introduce the basic concepts of statistical quality control that plays a vital role in the field of Engineering and Technology.

UNIT I PROBABILITY AND RANDOM VARIABLES

12

Probability – The axioms of probability – Conditional probability – Baye’s theorem – Discrete and continuous random variables – Moments – Moment generating functions – Distributions: Binomial, Poisson, Uniform, Exponential and Normal.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES

12

Joint distributions – marginal and conditional distributions –covariance – correlation – Karl Pearson’s correlation coefficient – Rank correlation – Spearman’s rank correlation coefficient – Kendall’s rank correlation coefficient - linear regression.

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| | Rational Suite 30 user License Open-Source Alternatives: ArgoUML, Visual Paradigm Eclipse IDE and JUnit, PCs | 30 |
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HS1421 AN INTRODUCTION TO ADVANCED READING AND WRITING

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OBJECTIVES:

The course will enable learners to

- To strengthen the reading skills of students of engineering.
- To enhance their writing skills with specific reference to technical writing
- To develop their critical thinking skills.
- To provide more opportunities to develop their project and proposal writing skills

UNIT I EFFECTIVE READING 6

Reading – Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title. Reading-Read for details-Use of graphic organizers to review and aid comprehension.

UNIT II CRITICAL READING 6

Reading– Understanding pronoun reference and use of connectors in a passage- speed reading techniques. Reading– Genre and Organization of Ideas- Reading– Critical reading and thinking- understanding how the text positions the reader.

UNIT III PARAGRAPH WRITING 6

Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence.-Write a descriptive paragraph Writing-State reasons and examples to support ideas in writing– Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT IV ESSAY WRITING 6

Writing– Elements of a good essay - Types of essays- descriptive-narrative- issue-based-

argumentative-analytical.

UNIT V EFFECTIVE WRITING

6

Writing– Email writing- visumes – Job application- Report Writing - Project writing-Writing convincing proposals

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- CO1 Understand how the text positions the reader
- CO2 Develop critical thinking while reading a text
- CO3 Develop a descriptive paragraph
- CO4 Make use of sentence structures effectively when creating an essay.
Demonstrate proper usage of grammar in writing E-Mails, Job application and project proposals
- CO5

TEXT BOOKS:

1. Gramer, F, Margot & Colin, S, Ward, 2011, *Reading and Writing (Level 3)* Oxford University Press, Oxford.
2. Debra Daise, CharlNorloff, and Paul Carne, 2011, *Reading and Writing (Level 4)* Oxford University Press: Oxford.

REFERENCE BOOKS:

1. Davis, Jason & Rhonda Llss. 2006 *Effective Academic Writing (Level 3)* Oxford University Press: Oxford.
2. E. Suresh Kumar and et al. 2012, *Enriching Speaking and Writing Skills*, Second Edition, Orient Black swan: Hyderabad.
3. Withrow, Jeans and et al. 2004 *Inspired to Write. Readings and Tasks to develop writing skills*, Cambridge University Press: Cambridge.
4. Goatly, Andrew, 2000 *Critical Reading and Writing*, Routledge: United States of America.
5. Petelin, Roslyn & Marsh Durham, 2004 *The Professional Writing Guide: Knowing Well and Knowing Why*, Business & Professional Publishing: Australia.

WEB RESOURCES:

- <http://learnenglishteens.britishcouncil.org/skills/reading>
- <https://learnenglish.britishcouncil.org/skills/reading>
- <https://www.readingrockets.org/article/25-activities-reading-and-writing-fun>
- <https://linguapress.com/advanced.htm>