

**ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.TECH INFORMATION TECHNOLOGY
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM**

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics and Information Technology for the applications relevant to various streams of Engineering and Technology.
2. To enrich graduates with the core competencies necessary for applying knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyze data in the context of business enterprise.
3. To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.
4. To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.
5. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

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)

1. To create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
2. To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

| PROGRAMME EDUCATIONAL OBJECTIVES | PROGRAMME OUTCOMES | | | | | | | | | | | |
|----------------------------------|--------------------|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | L |
| 1 | 3 | 2 | | | | | | | | | | |
| 2 | 3 | 3 | 1 | 1 | | | | | | | | 2 |
| 3 | | | 3 | | | 1 | | | | | | 3 |
| 4 | | | 3 | | 1 | 2 | 3 | 1 | | | | |
| 5 | | | | 3 | | | | 1 | 1 | 2 | 2 | 1 |

MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

| PROGRAM SPECIFIC OBJECTIVES | PROGRAMME OUTCOMES | | | | | | | | | | | |
|-----------------------------|--------------------|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | L |
| 1 | 3 | 2 | | | 3 | | | | 2 | 2 | | |
| 2 | | | | 3 | | | 3 | 3 | | | 3 | |

Contribution

1: Reasonable

2: Significant

3: Strong

SEMESTER I

| SI. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Communicative English | | | | | | | | | 3 | 3 | 2 | 2 |
| 2. | Engineering Mathematics I | 3 | 3 | 3 | | | | | | 2 | | | 2 |
| 3. | Engineering Physics | 3 | 3 | 3 | | | | 2 | | | | | 1 |
| 4. | Engineering Chemistry | 3 | 2 | 2 | | | | 3 | | | | | 1 |
| 5. | Problem Solving and Python Programming | 3 | 2 | 2 | | 3 | | | | | | | 2 |
| 6. | Engineering Graphics | 3 | 3 | | | | 2 | | | | | | 2 |
| 7. | Problem Solving and Python Programming Laboratory | 3 | 3 | 3 | | 3 | | | | | | | 2 |
| 8. | Physics and Chemistry Laboratory | 3 | 3 | | | | | | | | | | |

| SEMESTER II | | | | | | | | | | | | | |
|-------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| S.No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| 1. | Technical English | | | | | | | | | 3 | 3 | 2 | 2 |
| 2. | Engineering Mathematics II | 3 | 3 | 3 | | | | | | 2 | | | 2 |
| 3. | Physics for Information Science | 3 | 3 | 2 | | | | 2 | | | | | 2 |
| 4. | Basic Electrical, Electronics and Measurement Engineering | 3 | 2 | | | | | | | | | | |
| 5. | Information Technology Essentials | 3 | 3 | 3 | | 3 | | | | | 2 | 1 | 2 |
| 6. | Programming in C | 3 | 3 | 3 | | 2 | | | | | | | 2 |
| 7. | Engineering Practices Laboratory | 3 | 3 | | | | 3 | | | | | | 1 |
| 8. | C Programming Laboratory | 3 | 3 | 3 | | 3 | | | | | | | 2 |
| 9. | Information Technology Essentials Laboratory | 3 | 3 | 3 | | 3 | | | | | 2 | 2 | 2 |

SEMESTER III

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| 1. | Discrete Mathematics | 3 | 3 | 2 | | | | | | | | | 1 |
| 2. | Digital Principles and System Design | 3 | 3 | 3 | | | | | | | | | |
| 3. | Data Structures | 3 | 3 | 3 | | | | | | | | | |
| 4. | Object Oriented Programming | 2 | 2 | 3 | | 3 | | | | | | | |
| 5. | Analog and Digital Communication | 3 | 3 | 2 | | | | | | | | | |
| 6. | Data Structures Laboratory | 3 | 3 | 3 | | 2 | | | | | | | |
| 7. | Object Oriented Programming Laboratory | 3 | 2 | 3 | | 3 | | | | | | | |
| 8. | Digital Systems Laboratory | 3 | 3 | 3 | | 2 | | | | | | | |
| 9. | Interpersonal Skills/Listening & Speaking | | | | | | | | | 3 | 3 | 1 | 2 |

SEMESTER IV

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------------|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| 1. | Probability and Statistics | 3 | 3 | 3 | | | | | | | | | |
| 2. | Computer Architecture | 3 | 2 | 3 | | | | | | | | | |
| 3. | Database Management Systems | 3 | 2 | 3 | | | | | | | | | |
| 4. | Design and Analysis of Algorithms | 3 | 3 | 2 | 2 | | | | | | | | |
| 5. | Operating Systems | 3 | 1 | 3 | | | | | | | | | |
| 6. | Environmental Science and Engineering | | | | | | | 3 | | | | | |
| 7. | Database Management Systems Laboratory | 3 | 2 | 3 | | 2 | | | | | | | |
| 8. | Operating Systems Laboratory | 3 | 1 | 3 | | 2 | | | | | | | |
| 9. | Advanced Reading and Writing | | | | | | | | | 3 | 3 | 1 | 2 |

SEMESTER V

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| 1. | Algebra and Number Theory | 3 | 3 | 2 | | | | | | | | | |
| 2. | Computer Networks | 3 | 1 | 2 | | | | | | | | | |
| 3. | Microprocessors and Microcontrollers | 3 | 2 | 3 | | | | | | | | | |
| 4. | Web Technology | 3 | 1 | 1 | | 3 | | | | | | | |
| 5. | Software Engineering | 3 | 1 | 2 | | | | | | | 3 | | |
| 6. | Microprocessors and Microcontrollers Laboratory | 3 | 2 | 3 | | 2 | | | | | | | |
| 7. | Networks Laboratory | 3 | 1 | 2 | | 2 | | | | | | | |
| 8. | Web Technology Laboratory | 3 | 1 | 1 | | 3 | | | | | | | |

SEMESTER VI

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------------|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| 1. | Computational Intelligence | 3 | 3 | 3 | 3 | | 2 | | | | | | |
| 2. | Object Oriented Analysis and Design | 3 | 3 | 3 | 3 | | | | | | | | |
| 3. | Mobile Communication | 3 | 2 | 3 | | | | | | | | | |
| 4. | Big Data Analytics | 3 | 3 | 3 | 3 | | 2 | | | | | | |
| 5. | Computer Graphics and Multimedia | 3 | | 3 | | 2 | | | | | | | |
| 6. | Mobile Application Development Laboratory | 1 | | 2 | | 3 | | | | | | | |
| 7. | Object Oriented Analysis and Design Laboratory | 3 | 3 | 3 | 2 | 3 | | | | | | | |
| 8. | Mini Project | 3 | 3 | 3 | 1 | 3 | 3 | 3 | | | | | |

SEMESTER VII

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|-------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Principles of Management | | | | | | | | 2 | 2 | 3 | 3 | 2 |
| 2. | Cryptography and Network Security | 3 | 3 | 3 | 2 | | 2 | | | | | | |
| 3. | Cloud Computing | 2 | 3 | 3 | 2 | | 2 | | | | | | |
| 4. | Open Elective II | | | | | | | | | | | | |
| 5. | Professional Elective II | | | | | | | | | | | | |
| 6. | Professional Elective III | | | | | | | | | | | | |
| 7. | FOSS and Cloud Computing Laboratory | 2 | 3 | 3 | 2 | 3 | 2 | | | | | | |
| 8. | Security Laboratory | 3 | 3 | 3 | 2 | | 3 | | | | | | |

SEMESTER VIII

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Professional Elective IV | | | | | | | | | | | | |
| 2. | Professional Elective V | | | | | | | | | | | | |
| 3. | Project Work | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 3 | 3 | 3 | 2 |

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

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Software Testing | 2 | 2 | | 3 | | | | | | | | |
| 2. | Graph Theory and Applications | 3 | 3 | 2 | 3 | | | | | | | | |
| 3. | Digital Signal Processing | 3 | 3 | 3 | 3 | | 2 | 2 | | | | | |
| 4. | Information Storage and Management | 3 | 3 | | | | | | | | | | |
| 5. | Agile Methodologies | 3 | | | | 3 | | | | 3 | 3 | 3 | |
| 6. | Embedded Systems | 2 | 2 | 3 | | | 2 | 3 | | | | | |
| 7. | Intellectual Property Rights | | | | | | | | 3 | | 3 | 3 | |
| 8. | | | | | | | | | | | | | |

ELECTIVE - II

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Web Development Frameworks | 2 | | 3 | | 3 | | | | | | | |
| 2. | Machine Learning Techniques | 3 | 3 | 3 | 2 | | 2 | | | | | | |
| 3. | Formal Languages and Automata Theory | 3 | 3 | 3 | 3 | | 2 | | | | | | |
| 4. | Internet of Things | 2 | | 2 | | 3 | 3 | 3 | | | | | |
| 5. | Software Project Management | 2 | 2 | 2 | | | | | | 3 | 3 | 3 | |
| 6. | Service Oriented Architecture | 3 | 3 | 3 | | | 2 | 2 | | | | | |
| 7. | Total Quality Management | | | | | | | | 3 | 2 | 3 | 3 | 3 |
| 8. | | | | | | | | | | | | | |

ELECTIVE - III

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Human Computer Interaction | 3 | 3 | 3 | 2 | | 3 | | | | | | |
| 2. | C# and .Net Programming | 2 | | 3 | | 3 | | | | | | | |
| 3. | Wireless Ad hoc and Sensor Networks | 3 | 3 | 3 | | | | | | | | | |
| 4. | Foundation Skills in Integrated Product Development | 3 | 3 | 3 | 2 | | 2 | 2 | | | | 3 | |
| 5. | Advanced Topics on Databases | 3 | 3 | 3 | 2 | | | | | | | | |
| 6. | Disaster Management | 2 | 2 | 2 | | | 3 | 3 | | | | | |

ELECTIVE - IV

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| 1. | Social Network Analysis | 3 | 3 | 3 | 3 | | | | | | | | |
| 2. | Soft Computing | 2 | 3 | 3 | 3 | | | | | | | | |
| 3. | Cyber Forensics | 3 | 3 | 3 | 3 | | | | | | | | |
| 4. | Information Security | 3 | 3 | 3 | 3 | | | | | | | | |
| 5. | Digital Image Processing | 3 | 3 | 3 | 3 | | | | | | | | |
| 6. | Network Management | 2 | 3 | 3 | 3 | | | | | | | | |
| 7. | Professional Ethics in Engineering | | | | | | | | 3 | | | | 3 |

ELECTIVE - V

| Sl. No | COURSE TITLE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------------|----------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| 1. | Information Retrieval Techniques | 3 | 3 | 3 | | | | | | | | | |
| 2. | Green Computing | 3 | 3 | 3 | | | 3 | 3 | | | | | |
| 3. | Natural Language Processing | 3 | 3 | 3 | 3 | | | | | | | | |
| 4. | Speech Processing | 3 | 3 | 3 | 3 | | | | | | | | |
| 5. | Web Design and Management | 3 | | 3 | | | | | | | | | |
| 6. | Electronic Commerce | 3 | 1 | 1 | | | | | | | | 3 | 3 |
| 7. | Fundamentals of Nanoscience | 3 | 3 | 3 | | | | | | | | | |

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.TECH INFORMATION TECHNOLOGY
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. | IT8201 | Information Technology Essentials | PC | 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 |
| 9. | IT8211 | Information Technology Essentials Laboratory | PC | 2 | 0 | 0 | 2 | 1 |
| TOTAL | | | | 30 | 20 | 0 | 10 | 25 |

SEMESTER III

| Sl. 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. | EC8394 | Analog and Digital Communication | PC | 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

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-------------------|-------------|--|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | MA8391 | Probability and Statistics | 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. | GE8291 | Environmental Science and Engineering | HS | 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. | IT8501 | Web Technology | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8494 | Software Engineering | 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. | CS8581 | Networks Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | IT8511 | Web Technology 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. | IT8601 | Computational Intelligence | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8592 | Object Oriented Analysis and Design | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | IT8602 | Mobile Communication | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8091 | Big Data Analytics | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8092 | Computer Graphics and Multimedia | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | | Professional Elective I | PE | 3 | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | | | |
| 7. | CS8662 | Mobile Application Development Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 8. | CS8582 | Object Oriented Analysis and Design Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | IT8611 | Mini Project | EEC | 2 | 0 | 0 | 2 | 1 |
| 10. | HS8581 | Professional Communication | EEC | 2 | 0 | 0 | 2 | 1 |
| TOTAL | | | | 30 | 18 | 0 | 12 | 24 |

SEMESTER VII

| Sl.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. | IT8711 | FOSS and 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

| Sl. 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. | IT8811 | 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. | MA8251 | 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. | MA8391 | Probability and Statistics | 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. | CS8382 | Digital Systems Laboratory | ES | 4 | 0 | 0 | 4 | 2 |

PROFESSIONAL CORE (PC)

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---------------|--------------------|---|-----------------|------------------------|----------|----------|----------|----------|
| 1. | IT8201 | Information Technology Essentials | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | IT8211 | Information Technology Essentials Laboratory | PC | 2 | 0 | 0 | 2 | 1 |
| 3. | CS8251 | Programming in C | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8261 | C Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 5. | CS8391 | Data Structures | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | CS8392 | Object Oriented Programming | PC | 3 | 3 | 0 | 0 | 3 |
| 7. | EC8394 | Analog and Digital Communication | PC | 3 | 3 | 0 | 0 | 3 |
| 8. | CS8381 | Data Structures Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | CS8383 | Object Oriented Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | CS8491 | Computer Architecture | PC | 3 | 3 | 0 | 0 | 3 |
| 11. | CS8492 | Database Management Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 12. | CS8451 | Design and Analysis of Algorithms | PC | 3 | 3 | 0 | 0 | 3 |
| 13. | CS8493 | Operating Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 14. | CS8481 | Database Management Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 15. | CS8461 | Operating Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 16. | CS8591 | Computer Networks | PC | 3 | 3 | 0 | 0 | 3 |
| 17. | EC8691 | Microprocessors and Microcontrollers | PC | 3 | 3 | 0 | 0 | 3 |
| 18. | IT8501 | Web Technology | PC | 3 | 3 | 0 | 0 | 3 |
| 19. | CS8494 | Software Engineering | PC | 3 | 3 | 0 | 0 | 3 |
| 20. | EC8681 | Microprocessors and Microcontrollers Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 21. | CS8581 | Networks Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 22. | IT8511 | Web Technology Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 23. | IT8601 | Computational Intelligence | PC | 3 | 3 | 0 | 0 | 3 |
| 24. | CS8592 | Object Oriented Analysis and Design | PC | 3 | 3 | 0 | 0 | 3 |
| 25. | IT8602 | Mobile Communication | PC | 3 | 3 | 0 | 0 | 3 |
| 26. | CS8091 | Big Data Analytics | PC | 3 | 3 | 0 | 0 | 3 |
| 27. | CS8092 | Computer Graphics and Multimedia | PC | 3 | 3 | 0 | 0 | 3 |
| 28. | CS8662 | Mobile Application Development Laboratory | PC | 4 | 0 | 0 | 4 | 2 |

| | | | | | | | | |
|-----|--------|--|----|---|---|---|---|---|
| 29. | CS8582 | Object Oriented Analysis and Design Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 30. | CS8792 | Cryptography and Network Security | PC | 3 | 3 | 0 | 0 | 3 |
| 31. | CS8791 | Cloud Computing | PC | 3 | 3 | 0 | 0 | 3 |
| 32. | IT8711 | FOSS and Cloud Computing Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 33. | 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. | IT8076 | Software Testing | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8077 | Graph Theory and Applications | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | IT8071 | Digital Signal Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | IT8001 | Information Storage and Management | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8072 | Agile Methodologies | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | IT8072 | Embedded Systems | 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. | IT8002 | Web Development Frameworks | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8082 | Machine Learning Techniques | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | IT8003 | Formal Languages and Automata Theory | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | CS8081 | Internet of Things | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | IT8075 | Software Project Management | 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. | CS8079 | Human Computer Interaction | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8073 | C# and .Net Programming | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8088 | Wireless Adhoc and Sensor Networks | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | GE8072 | Foundation Skills in Integrated Product Development | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | CS8071 | Advanced Topics on Databases | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | GE8074 | Human Rights | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8071 | Disaster Management | PE | 3 | 3 | 0 | 0 | 3 |

**SEMESTER VIII
ELECTIVE - IV**

| Sl. No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|--------|-------------|------------------------------------|----------|-----------------|---|---|---|---|
| 1. | CS8085 | Social Network Analysis | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | CS8086 | Soft Computing | PE | 3 | 3 | 0 | 0 | 3 |
| 3. | CS8074 | Cyber Forensics | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | IT8073 | Information Security | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | EC8093 | Digital Image Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | IT8004 | Network Management | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8076 | Professional Ethics in Engineering | PE | 3 | 3 | 0 | 0 | 3 |

**SEMESTER VIII
ELECTIVE - V**

| Sl.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. | CS8084 | Natural Language Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 4. | IT8077 | Speech Processing | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | IT8078 | Web Design and Management | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | IT8005 | Electronic Commerce | PE | 3 | 3 | 0 | 0 | 3 |
| 7. | GE8073 | Fundamentals of Nanoscience | PE | 3 | 3 | 0 | 0 | 3 |

***Professional Electives are grouped according to elective number as was done previously.**

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. | IT8611 | Mini Project | EEC | 2 | 0 | 0 | 2 | 1 |
| 4. | HS8581 | Professional Communication | EEC | 2 | 0 | 0 | 2 | 1 |
| 5. | IT8811 | Project Work | EEC | 20 | 0 | 0 | 20 | 10 |

SUMMARY

| S.NO. | SUBJECT AREA | CREDITS AS PER SEMESTER | | | | | | | | CREDITS TOTAL | Percentage |
|-------|------------------------|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|------------|
| | | I | II | III | IV | V | VI | VII | VIII | | |
| 1. | HS | 4 | 4 | | 3 | | | 3 | | 14 | 8.6% |
| 2. | BS | 12 | 7 | 4 | 4 | 4 | | | | 31 | 16.84% |
| 3. | ES | 9 | 5 | 6 | | | | | | 20 | 11.41% |
| 4. | PC | | 9 | 13 | 16 | 18 | 19 | 10 | | 85 | 45.56% |
| 5. | PE | | | | | 3 | 3 | 6 | 6 | 18 | 8.15% |
| 6. | OE | | | | | | | 3 | | 3 | 3.26% |
| 7. | EEC | | | 1 | 1 | | 2 | | 10 | 14 | 7.0% |
| | Total | 25 | 25 | 24 | 24 | 25 | 24 | 22 | 16 | 185 | |
| 8. | Non Credit / Mandatory | | | | | | | | | | |

HS8151

COMMUNICATIVE ENGLISH

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

OBJECTIVES:

- To develop the basic reading and writing skills of first year engineering and technology students.
- To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.
- To help learners develop their speaking skills and speak fluently in real contexts.
- To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- **Writing-** completing sentences- - developing hints. **Listening-** short texts- short formal and informal conversations. **Speaking-** introducing oneself - exchanging personal information- **Language development-** Wh- Questions- asking and answering-yes or no questions- parts of speech. **Vocabulary development--** prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- **Writing** – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –**Listening-** telephonic conversations. **Speaking** – sharing information of a personal kind—greeting – taking leave- **Language development** – prepositions, conjunctions **Vocabulary development-** guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) **Writing-** understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences **Listening** – listening to longer texts and filling up the table- product description- narratives from different sources. **Speaking-** asking about routine actions and expressing opinions. **Language development-** degrees of comparison- pronouns- direct vs indirect questions- **Vocabulary development** – single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines **Writing-** letter writing, informal or personal letters-e-mails-conventions of personal email- **Listening-** listening to dialogues or conversations and completing exercises based on them. **Speaking-** speaking about oneself- speaking about one's friend- **Language development-** Tenses- simple present-simple past-present continuous and past continuous- **Vocabulary development-** synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING**12**

Reading- longer texts- close reading –**Writing**- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-**Listening** – listening to talks- conversations- **Speaking** – participating in conversations- short group conversations-**Language development**-modal verbs- present/ past perfect tense - **Vocabulary development**-collocations- fixed and semi-fixed expressions

TOTAL: 60 PERIODS**OUTCOMES:****At the end of the course, learners will be able to:**

- Read articles of a general kind in magazines and newspapers.
- Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
- Comprehend conversations and short talks delivered in English
- Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

1. Board of Editors. **Using English** A Coursebook for Undergraduate Engineers and Technologists. Orient BlackSwan Limited, Hyderabad: 2015
2. Richards, C. Jack. **Interchange Students' Book-2** New Delhi: CUP, 2015.

REFERENCES:

- 1 Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge, 2011.
- 2 Means, L. Thomas and Elaine Langlois. **English & Communication For Colleges**. Cengage Learning, USA: 2007
- 3 Redston, Chris & Gillies Cunningham **Face2Face** (Pre-intermediate Student's Book & Workbook) Cambridge University Press, New Delhi: 2005
- 4 Comfort, Jeremy, et al. **Speaking Effectively : Developing Speaking Skills for Business English**. Cambridge University Press, Cambridge: Reprint 2011
- 5 Dutt P. Kiranmai and Rajeevan Geeta. **Basic Communication Skills**, Foundation Books: 2013

MA8151**ENGINEERING MATHEMATICS – I**

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

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS**12**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

- Use both the limit definition and rules of differentiation to differentiate functions.
- Apply differentiation to solve maxima and minima problems.
- Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
- Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
- Apply various techniques in solving differential equations.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

1. Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
4. Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
5. Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - 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 - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conduction in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL : 45 PERIODS

OUTCOMES:**Upon completion of this course,**

- The students will gain knowledge on the basics of properties of matter and its applications,
- The Students Will Acquire Knowledge On The Concepts Of Waves And Optical Devices And Their Applications in fibre optics,
- The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
- The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and
- The students will understand the basics of crystals, their structures and different crystal growth techniques.

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. Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics". W.H. Freeman, 2007.

CY8151**ENGINEERING CHEMISTRY****L T P C
3 0 0 3****OBJECTIVES:**

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT**9**

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS**9**

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich's adsorption isotherm – Langmuir's adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement. Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE**9**

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION**9**

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES**9**

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H₂-O₂ fuel cell.

TOTAL: 45 PERIODS**OUTCOMES:**

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

GE8151**PROBLEM SOLVING AND PYTHON PROGRAMMING****L T P C****3 0 0 3****OBJECTIVES:**

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

REFERENCES:

1. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.
4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
5. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

GE8152**ENGINEERING GRAPHICS****L T P C**
2 0 4 4**OBJECTIVES:**

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination)**1**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING**7+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE**6+12**

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS**5+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES**5+12**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

6+12

Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- Familiarize with the fundamentals and standards of Engineering graphics
- Perform freehand sketching of basic geometrical constructions and multiple views of objects.
- Project orthographic projections of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS:

1. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
4. Luzzader, Warren.J. and Duff, John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. N S Parthasarathy And Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
6. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

GE8161

**PROBLEM SOLVING AND PYTHON PROGRAMMING
LABORATORY**

**L T P C
0 0 4 2**

OBJECTIVES

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

OUTCOMES

Upon completion of the course, students will be able to

- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

TOTAL :60 PERIODS

BS8161

PHYSICS AND CHEMISTRY LABORATORY
(Common to all branches of B.E. / B.Tech Programmes)

**L T P C
0 0 4 2**

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus by non-uniform bending method
3. (a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
4. Determination of thermal conductivity of a bad conductor – Lee's Disc method.

5. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
6. Determination of wavelength of mercury spectrum – spectrometer grating
7. Determination of band gap of a semiconductor
8. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
 - To acquaint the students with the determination of molecular weight of a polymer by viscometry.
1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
 2. Determination of total, temporary & permanent hardness of water by EDTA method.
 3. Determination of DO content of water sample by Winkler's method.
 4. Determination of chloride content of water sample by argentometric method.
 5. Estimation of copper content of the given solution by Iodometry.
 6. Determination of strength of given hydrochloric acid using pH meter.
 7. Determination of strength of acids in a mixture of acids using conductivity meter.
 8. Estimation of iron content of the given solution using potentiometer.
 9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
 10. Estimation of sodium and potassium present in water using flame photometer.
 11. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
 12. Pseudo first order kinetics-ester hydrolysis.
 13. Corrosion experiment-weight loss method.
 14. Determination of CMC.
 15. Phase change in a solid.
 16. Conductometric titration of strong acid vs strong base.

OUTCOMES:

- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis (8TH edition, 2014)

HS8251

TECHNICAL ENGLISH

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OBJECTIVES:

The Course prepares second semester engineering and Technology students to:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- **Speaking** –Asking for and giving directions- **Reading** – reading short technical texts from journals- newspapers- **Writing-** purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-**Vocabulary Development-** technical vocabulary **Language Development** –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them-**Speaking** – describing a process-**Reading** – reading longer technical texts- identifying the various transitions in a text- paragraphing- **Writing-** interpreting charts, graphs- **Vocabulary Development-**vocabulary used in formal letters/emails and reports **Language Development-** impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talks on engineering/technology -**Speaking** – introduction to technical presentations- **Reading** – longer texts both general and technical, practice in speed reading; **Writing-**Describing a process, use of sequence words- **Vocabulary Development-** sequence words- Misspelled words. **Language Development-** embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. **Speaking** – mechanics of presentations- **Reading** – reading for detailed comprehension- **Writing-** email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays-- **Vocabulary Development-** finding suitable synonyms-paraphrasing-. **Language Development-** clauses- if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; **Speaking** –participating in a group discussion -**Reading**– reading and understanding technical articles **Writing**– Writing reports- minutes of a meeting- accident and survey- **Vocabulary Development-** verbal analogies **Language Development-** reported speech.

TOTAL :60 PERIODS

OUTCOMES:

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

- Read technical texts and write area-specific texts effortlessly.
- Listen and comprehend lectures and talks in their area of Specialization successfully.
- Speak appropriately and effectively in varied formal and informal contexts.
- Write reports and winning job applications.

TEXT BOOKS:

1. Board of editors. **Fluency in English A Course book for Engineering and Technology**. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana.N.P and Saveetha. C. **English for Technical Communication**. Cambridge University Press: New Delhi, 2016.

REFERENCES:

1. Raman, Meenakshi and Sharma, Sangeetha- **Technical Communication Principles and Practice**.Oxford University Press: New Delhi,2014.
2. Kumar, Suresh. E. **Engineering English**. Orient Blackswan: Hyderabad,2015
3. Booth-L. Diana, **Project Work**, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, **English for Presentations**, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, **English & Communication For Colleges**. Cengage Learning, USA: 2007

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251

ENGINEERING MATHEMATICS – II

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

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES

12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS

12

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS**12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c, cz, \frac{1}{z}, z^2$ - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION**12**

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS**12**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS**OUTCOMES :**

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

- Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
- Gradient, divergence and curl of a vector point function and related identities.
- Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
- Analytic functions, conformal mapping and complex integration.
- Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "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. Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.
3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
5. Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

OBJECTIVES:

- To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic and optical properties of materials and Nano-electronic devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction- saturation magnetization and Curie temperature – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses— Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT V NANO DEVICES 9

Electron density in bulk material – Size dependence of Fermi energy – Quantum confinement – Quantum structures – Density of states in quantum well, quantum wire and quantum dot structure - Band gap of nanomaterials – Tunneling: single electron phenomena and single electron transistor – Quantum dot laser. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance – Carbon nanotubes: Properties and applications.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Gain knowledge on classical and quantum electron theories, and energy band structures,
- Acquire knowledge on basics of semiconductor physics and its applications in various devices,
- Get knowledge on magnetic properties of materials and their applications in data storage,
- Have the necessary understanding on the functioning of optical materials for optoelectronics,
- Understand the basics of quantum structures and their applications in carbon electronics..

TEXT BOOKS:

1. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley 2012.
2. Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.
3. Kittel, C. "Introduction to Solid State Physics". Wiley, 2005.

REFERENCES:

1. Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer-Verlag, 2012.
2. Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009.
3. Rogers, B., Adams, J. & Pennathur, S. "Nanotechnology: Understanding Small Systems". CRC Press, 2014.

BE8255**BASIC ELECTRICAL, ELECTRONICS AND MEASUREMENT
ENGINEERING****L T P C
3 0 0 3****OBJECTIVES:**

- To understand the fundamentals of electronic circuit constructions.
- To learn the fundamental laws, theorems of electrical circuits and also to analyse them
- To study the basic principles of electrical machines and their performance
- To study the different energy sources, protective devices and their field applications
- To understand the principles and operation of measuring instruments and transducers

UNIT I ELECTRICAL CIRCUITS ANALYSIS**9**

Ohms Law, Kirchoff's Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems - Thevenins theorem, Norton theorem, maximum power transfer theorem and superposition theorem, three phase supply-Instantaneous, Reactive and apparent power-star delta conversion.

UNIT II ELECTRICAL MACHINES**9**

DC and AC ROTATING MACHINES: Types, Construction, principle, Emf and torque equation, application Speed Control- Basics of Stepper Motor – Brushless DC motors- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation- All day efficiency calculation.

UNIT III UTILIZATION OF ELECTRICAL POWER**9**

Renewable energy sources-wind and solar panels. Illumination by lamps- Sodium Vapour, Mercury vapour, Fluorescent tube. Domestic refrigerator and air conditioner-Electric circuit, construction and working principle. Batteries-NiCd, Pb Acid and Li ion-Charge and Discharge Characteristics. Protection-need for earthing, fuses and circuit breakers.Energy Tariff calculation for domestic loads.

UNIT IV ELECTRONIC CIRCUITS**9**

PN Junction-VI Characteristics of Diode, zener diode, Transistors configurations - amplifiers. Op amps- Amplifiers, oscillator,rectifiers, differentiator, integrator, ADC, DAC. Multi vibrator using 555 Timer IC . Voltage regulator IC using LM 723,LM 317.

UNIT V ELECTRICAL MEASUREMENT**9**

Characteristic of measurement-errors in measurement, torque in indicating instruments- moving coil and moving iron meters, Energy meter and watt meter. Transducers- classification-thermo electric, RTD, Strain gauge, LVDT, LDR and piezoelectric. Oscilloscope-CRO.

TOTAL: 45 PERIODS

OUTCOMES:**Upon completion of the course, the students will be able to:**

- Discuss the essentials of electric circuits and analysis.
- Discuss the basic operation of electric machines and transformers
- Introduction of renewable sources and common domestic loads.
- To understand the fundamentals of electronic circuit constructions.
- Introduction to measurement and metering for electric circuits.

TEXT BOOKS:

1. D.P. Kotharti AND I.J Nagarath, Basic Electrical and Electronics Engineering, Mc Graw Hill, Third Edition, 2016.
2. M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronics ENGINEERING, OXFORD, 2016.

REFERENCES:

1. S.B. Lal Seksen and Kaustuv Dasgupta, Fundaments of Electrical Engineering, Cambridge, 2016.
2. B.L Theraja, Fundamentals of Electrical Engineering And Electronics'. Chand & Co, 2008.
3. S.K.Sahdev, Basic of Electrical Engineering, Pearson, 2015.
4. John Bird, —Electrical and Electronic Principles and Technologyll, Fourth Edition, Elsevier, 2010.
5. Mittle,Mittal, Basic Electrical Engineeringll, 2nd Edition, Tata McGraw-Hill Edition, 2016.
6. C.L.Wadhwa, "Generation, Distribution and Utilisation of Electrical Energy",New Age international pvt.ltd.,2003.

IT8201**INFORMATION TECHNOLOGY ESSENTIALS****L T P C
3 0 0 3****OBJECTIVES:**

- To introduce the concept of Internet, Networks and its working principles.
- To know scripting languages.
- To understand various applications related to Information Technology.

UNIT I WEB ESSENTIALS**9**

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server

UNIT II SCRIPTING ESSENTIALS**9**

Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts

UNIT III NETWORKING ESSENTIALS**9**

Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

UNIT IV MOBILE COMMUNICATION ESSENTIALS 9
Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture - Voice calls & SMS

UNIT V APPLICATION ESSENTIALS 9
Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

TOTAL: 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Design and deploy web-sites
- Design and deploy simple web-applications
- Create simple database applications
- Develop information system
- Describe the basics of networking and mobile communications

TEXT BOOKS:

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
2. James F. Kurose, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson, 2012.

REFERENCES:

1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
2. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
3. it-ebooks.org

CS8251 PROGRAMMING IN C L T P C
3 0 0 3

OBJECTIVES:

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions , pointers and structures
- To do input/output and file handling in C

UNIT I BASICS OF C PROGRAMMING 9
Introduction to programming paradigms - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives - Compilation process

UNIT II ARRAYS AND STRINGS 9
Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT III FUNCTIONS AND POINTERS

9

Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES

9

Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Self referential structures – Dynamic memory allocation - Singly linked list - typedef.

UNIT V FILE PROCESSING

9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Develop simple applications in C using basic constructs
- Design and implement applications using arrays and strings
- Develop and implement applications in C using functions and pointers.
- Develop applications in C using structures.
- Design applications using sequential and random access file processing.

TEXT BOOKS:

1. Reema Thareja, "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, 2006

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)**I CIVIL ENGINEERING PRACTICE****13****Buildings:**

- (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

- (a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
 (b) Study of pipe connections requirements for pumps and turbines.
 (c) Preparation of plumbing line sketches for water supply and sewage works.
 (d) Hands-on-exercise:
 Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
 (e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

- (a) Study of the joints in roofs, doors, windows and furniture.
 (b) Hands-on-exercise:
 Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE**18****Welding:**

- (a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
 (b) Gas welding practice

Basic Machining:

- (a) Simple Turning and Taper turning
 (b) Drilling Practice

Sheet Metal Work:

- (a) Forming & Bending:
 (b) Model making – Trays and funnels.
 (c) Different type of joints.

Machine assembly practice:

- (a) Study of centrifugal pump
 (b) Study of air conditioner

Demonstration on:

- (a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
 (b) Foundry operations like mould preparation for gear and step cone pulley.
 (c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

- III ELECTRICAL ENGINEERING PRACTICE** **13**
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
 2. Fluorescent lamp wiring.
 3. Stair case wiring
 4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
 5. Measurement of energy using single phase energy meter.
 6. Measurement of resistance to earth of an electrical equipment.
- IV ELECTRONICS ENGINEERING PRACTICE** **16**
1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
 2. Study of logic gates AND, OR, EX-OR and NOT.
 3. Generation of Clock Signal.
 4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
 5. Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- Fabricate carpentry components and pipe connections including plumbing works.
- Use welding equipments to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
3. Standard woodworking tools 15 Sets.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos
(b) Demolition Hammer 2 Nos
(c) Circular Saw 2 Nos
(d) Planer 2 Nos
(e) Hand Drilling Machine 2 Nos
(f) Jigsaw 2 Nos

MECHANICAL

| | |
|---|-----------|
| 1. Arc welding transformer with cables and holders | 5 Nos. |
| 2. Welding booth with exhaust facility | 5 Nos. |
| 3. Welding accessories like welding shield, chipping hammer, wire brush, etc. | 5 Sets. |
| 4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. | 2 Nos. |
| 5. Centre lathe | 2 Nos. |
| 6. Hearth furnace, anvil and smithy tools | 2 Sets. |
| 7. Moulding table, foundry tools | 2 Sets. |
| 8. Power Tool: Angle Grinder | 2 Nos |
| 9. Study-purpose items: centrifugal pump, air-conditioner | One each. |

ELECTRICAL

| | |
|--|---------|
| 1. Assorted electrical components for house wiring | 15 Sets |
| 2. Electrical measuring instruments | 10 Sets |
| 3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each | |
| 4. Megger (250V/500V) | 1 No. |
| 5. Power Tools: (a) Range Finder | 2 Nos |
| (b) Digital Live-wire detector | 2 Nos |

ELECTRONICS

| | |
|---|---------|
| 1. Soldering guns | 10 Nos. |
| 2. Assorted electronic components for making circuits | 50 Nos. |
| 3. Small PCBs | 10 Nos. |
| 4. Multimeters | 10 Nos. |
| 5. Study purpose items: Telephone, FM radio, low-voltage power supply | |

CS8261

C PROGRAMMING LABORATORY

**L T P C
0 0 4 2**

OBJECTIVES:

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures
- To develop applications in C using file processing

LIST OF EXPERIMENTS:

1. Programs using I/O statements and expressions.
2. Programs using decision-making constructs.
3. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Check whether a given number is Armstrong number or not?

6. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions
 - 5 if it is a perfect cube
 - 4 if it is a multiple of 4 and divisible by 6
 - 3 if it is a prime number
 Sort the numbers based on the weight in the increasing order as shown below
 <10,its weight>,<36,its weight><89,its weight>
7. Populate an array with height of persons and find how many persons are above the average height.
8. Populate a two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.
9. Given a string "a\$bcd./fg" find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)
10. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
11. From a given paragraph perform the following using built-in functions:
 - a. Find the total number of words.
 - b. Capitalize the first word of each sentence.
 - c. Replace a given word with another word.
12. Solve towers of Hanoi using recursion.
13. Sort the list of numbers using pass by reference.
14. Generate salary slip of employees using structures and pointers.
15. Compute internal marks of students for five different subjects using structures and functions.
16. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
17. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

Mini Project

18. Create a "Railway reservation system" with the following modules
 - Booking
 - Availability checking
 - Cancellation
 - Prepare chart

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Develop C programs for simple applications making use of basic constructs, arrays and strings.
- Develop C programs involving functions, recursion, pointers, and structures.
- Design applications using sequential and random access file processing.

IT8211

**INFORMATION TECHNOLOGY ESSENTIALS
LABORATORY**

**L T P C
0 0 2 1**

OBJECTIVES:

- To write simple scripts for the creation of web sites
 - To create various information technology enabled applications
1. Creation of interactive web sites - Design using HTML and authoring tools
 2. Creation of simple PHP scripts - Dynamism in web sites
 3. Handling multimedia content in web sites
 4. Database applications using PHP and MySQL
 5. Study of computer networking components
 6. Creation of information retrieval system using web, PHP and MySQL
 7. Study of Technologies associated with mobile devices
 8. Creation of Personal Information System

TOTAL: 30 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Design interactive websites using basic HTML tags, different styles, links and with all
- Basic control elements.
- Create client side and server side programs using scripts using PHP.
- Design dynamic web sites and handle multimedia components
- Create applications with PHP connected to database.
- Create Personal Information System
- Implement the technologies behind computer networks and mobile communication.

MA8351

DISCRETE MATHEMATICS

**L T P C
4 0 0 4**

OBJECTIVES:

- To extend student's logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of lattices and boolean algebra which are widely used in computer science and engineering.

UNIT I LOGIC AND PROOFS

12

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT II COMBINATORICS

12

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications