
KCG

COLLEGE OF TECHNOLOGY

AFFILIATED TO ANNA UNIVERSITY | AUTONOMOUS

# CURRICULUM & SYLLABUS

# B.E COMPUER SCIENCE AND ENGINEERING

# (REGULATIONS 2023)

# ACADEMIC YEAR 2023-2024

# B.E. COMPUTER SCIENCE AND ENGINEERING

## SEMESTER – I

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| | 23IP101 | Induction Programme | | - | - | - | - | - |
| **THEORY** | | | | | | | | |
| 1 | 23HS101 | Essential Communication | HSMC | 3 | 0 | 0 | 3 | 3 |
| 2 | 23MA101 | Matrices and Calculus | BSC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23CS101 | Programming in C | ESC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23HS102 | Heritage of Tamils | HSMC | 1 | 0 | 0 | 1 | 1 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 5 | 23PH111 | Engineering Physics | BSC | 3 | 0 | 2 | 5 | 4 |
| 6 | 23CY111 | Engineering Chemistry | BSC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 7 | 23CS121 | C Programming Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 8 | 23HS121 | Communication Skills Laboratory | HSMC | 0 | 0 | 2 | 2 | 1 |
| 9 | 23CS122 | Computational Thinking | ESC | 0 | 0 | 2 | 2 | 1 |
| 10 | 23HS122 | General Clubs / Technical Clubs / NCC / NSS / Extension Activities | HSMC | 0 | 0 | 2 | 2 | 1* |
| **TOTAL** | | | | **16** | **0** | **14** | **30** | **22** |

## SEMESTER – II

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1 | 23HS201/ 23HS202 | Professional English / Foreign Language | HSMC | 3 | 0 | 0 | 3 | 3 |
| 2 | 23MA204 | Probability and Statistics | BSC | 3 | 1 | 0 | 4 | 4 |
| 3 | 23PH205 | Physics for Information Science | BSC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23CS201 | Data Structures using C | PCC | 3 | 0 | 0 | 3 | 3 |
| 5 | 23HS203 | Tamils and Technology | HSMC | 1 | 0 | 0 | 1 | 1 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 6 | 23EE281 | Basic Electrical and Electronics Engineering | ESC | 2 | 0 | 2 | 4 | 3 |
| 7 | 23ME211 | Engineering Graphics | ESC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 8 | 23ME221 | Engineering Practices Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 9 | 23CS221 | Data Structures Using C Laboratory | PCC | 0 | 0 | 4 | 4 | 2 |
| 10 | 23HS221 | Soft Skills | EEC | 0 | 0 | 2 | 2 | 1* |
| **TOTAL** | | | | **18** | **1** | **14** | **33** | **25** |

## SEMESTER III

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1 | 23MA202 | Discrete Mathematics | BSC | 3 | 1 | 0 | 4 | 4 |
| 2 | 23CS301 | Object Oriented Programming | PCC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23CS302 | Database Management Systems | PCC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23HS301 | Universal Human Values and Ethics | HSMC | 3 | 0 | 0 | 3 | 3 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 5 | 23CS311 | Digital Principles and System Design | PCC | 3 | 0 | 2 | 5 | 4 |
| 6 | 23CS312 | Design and Analysis of Algorithms | PCC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 7 | 23CS321 | Object Oriented Programming Laboratory | PCC | 0 | 0 | 4 | 4 | 2 |
| 8 | 23CS322 | Database Management Systems Laboratory | PCC | 0 | 0 | 4 | 4 | 2 |
| 9 | 23ES391 | Presentation Skills | EEC | 0 | 0 | 2 | 2 | 1* |
| **TOTAL** | | | | **18** | **1** | **14** | **33** | **25** |

## SEMESTER IV

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1 | 23MA301 | Linear Algebra | BSC | 3 | 1 | 0 | 4 | 4 |
| 2 | 23CS401 | Operating Systems | PCC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23CS402 | Artificial Intelligence | PCC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23CS403 | Theory of Computation | PCC | 3 | 0 | 0 | 3 | 3 |
| 5 | 23CS404 | Computer Architecture | PCC | 3 | 0 | 0 | 3 | 3 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 6 | 23CS411 | Software Engineering | PCC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 7 | 23CS421 | Operating Systems Laboratory | PCC | 0 | 0 | 4 | 4 | 2 |
| 8 | 23CS422 | Artificial Intelligence Laboratory | PCC | 0 | 0 | 4 | 4 | 2 |
| 9 | 23ES491 | Aptitude and Logical Reasoning - 1 | EEC | 0 | 0 | 2 | 2 | 1* |
| 10 | 23CS423 | Mini Project – 1 | EEC | 0 | 0 | 2 | 2 | 1 |
| **TOTAL** | | | | **18** | **1** | **14** | **33** | **25** |

## SEMESTER V

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1 | 23RE501 | Research Methodology and IPR | ESC | 2 | 0 | 0 | 2 | 2 |
| 2 | 23CS501 | Computer Networks | PCC | 3 | 0 | 0 | 3 | 3 |
| 3 | | Department Elective - 1 | DEC | 3 | 0 | 0 | 3 | 3 |
| 4 | | Department Elective - 2 | DEC | 3 | 0 | 0 | 3 | 3 |
| 5 | | Non Department Elective - 1 (Emerging Technologies) | NEC | 3 | 0 | 0 | 3 | 3 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 6 | 23CS511 | Compiler Design | PCC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 7 | 23CS521 | Computer Networks Lab | PCC | 0 | 0 | 4 | 4 | 2 |
| 8 | 23CS522 | Mini Project – 2 | EEC | 0 | 0 | 4 | 4 | 2 |
| 9 | 23ES591 | Aptitude and Logical Reasoning - 2 | EEC | 0 | 0 | 2 | 2 | 1* |
| **TOTAL** | | | | **17** | **0** | **12** | **29** | **22** |

## SEMESTER VI

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1 | 23CS601 | Cyber Security | PCC | 3 | 0 | 0 | 3 | 3 |
| 2 | | Department Elective - 3 | DEC | 3 | 0 | 0 | 3 | 3 |
| 3 | | Department Elective - 4 | DEC | 3 | 0 | 0 | 3 | 3 |
| 4 | | Non-Department Elective - 2 (Management / safety) | NEC | 3 | 0 | 0 | 3 | 3 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 5 | 23CE611 | Environmental Sciences and Engineering | ESC | 3 | 0 | 2 | 5 | 4 |
| 6 | 23CS611 | Internet Programming | PCC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 7 | 23CS621 | Project Work - Phase 1 | EEC | 0 | 0 | 4 | 4 | 2 |
| 8 | 23CS622 | Technical Training | EEC | 0 | 0 | 2 | 2 | 1 |
| 9 | 23CS623 | Technical Seminar – 1 | ESC | 0 | 0 | 2 | 2 | 1 |
| **TOTAL** | | | | **18** | **0** | **12** | **30** | **24** |

## SEMESTER VII

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1 | | Non-Department Elective - 3 (Management) | NEC | 3 | 0 | 0 | 3 | 3 |
| 2 | | Department Elective - 5 | DEC | 3 | 0 | 0 | 3 | 3 |
| 3 | | Department Elective - 6 | DEC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23CS701 | Comprehension | EEC | 2 | 0 | 0 | 2 | 2 |
| **THEORY AND PRACTICALS** | | | | | | | | |
| 5 | 23CS711 | Machine Learning and it's applications | PCC | 3 | 0 | 2 | 5 | 4 |
| **PRACTICALS** | | | | | | | | |
| 6 | 23CS721 | Project Work - Phase 2 | EEC | 0 | 0 | 6 | 6 | 3 |
| 7 | 23CS722 | Technical Seminar – 2 | ESC | 0 | 0 | 4 | 4 | 2 |
| **TOTAL** | | | | **14** | **0** | **12** | **26** | **20** |

## SEMESTER VIII

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| | | | | | | | | |
| 1 | 23CS821/ 23CS822 | Internship / Capstone Project | EEC | 0 | 0 | 20 | 20 | 10 |
| **TOTAL** | | | | 0 | 0 | 20 | 20 | 10 |

- **Internship duration of 2 months at a stretch and the rest of (1 month) 30 days spread over semesters 3 to 8**

**TOTAL CREDITS: 173**

## DEPARTMENT ELECTIVE COURSES

## ELECTIVE 1: CLOUD COMPUTING

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23IT031 | Distributed and Cloud Computing | DEC | 2 | 0 | 2 | 4 | 3 |
| 2 | 23IT032 | Cloud Services Management | DEC | 2 | 0 | 2 | 4 | 3 |
| 3 | 23IT033 | Virtualization | DEC | 2 | 0 | 2 | 4 | 3 |
| 4 | 23IT034 | Cloud Database Management | DEC | 2 | 0 | 2 | 4 | 3 |
| 5 | 23IT035 | Storage Technologies | DEC | 2 | 0 | 2 | 4 | 3 |
| 6 | 23IT036 | Security and Privacy in Cloud | DEC | 2 | 0 | 2 | 4 | 3 |
| 7 | 23IT037 | Stream Processing | DEC | 2 | 0 | 2 | 4 | 3 |
| 8 | 23IT038 | GDP and Cloud Web Services | DEC | 2 | 0 | 2 | 4 | 3 |

## ELECTIVE 2: FULL STACK DEVELOPMENT

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23CS031 | Java Full Stack Development | DEC | 2 | 0 | 2 | 4 | 3 |
| 2 | 23CS032 | Mobile App Development | DEC | 2 | 0 | 2 | 4 | 3 |
| 3 | 23CS033 | UI and UX Design | DEC | 2 | 0 | 2 | 4 | 3 |
| 4 | 23CS034 | MERN Stack Web Development | DEC | 2 | 0 | 2 | 4 | 3 |
| 5 | 23CS035 | Dev Ops | DEC | 2 | 0 | 2 | 4 | 3 |
| 6 | 23CS036 | Cognitive Systems | DEC | 2 | 0 | 2 | 4 | 3 |
| 7 | 23CS037 | Advanced Java Programming | DEC | 2 | 0 | 2 | 4 | 3 |
| 8 | 23CS038 | Python Full Stack Development | DEC | 2 | 0 | 2 | 4 | 3 |

## ELECTIVE 3: ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23IT039 | Knowledge Engineering | DEC | 3 | 0 | 0 | 3 | 3 |
| 2 | 23IT040 | Introduction to Data Science | DEC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23IT041 | Neural Networks and Deep Learning | DEC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23IT042 | Natural Language Processing | DEC | 3 | 0 | 0 | 3 | 3 |
| 5 | 23IT043 | Principle practices of AI | DEC | 3 | 0 | 0 | 3 | 3 |
| 6 | 23IT044 | Big Data Analytics | DEC | 3 | 0 | 0 | 3 | 3 |
| 7 | 23IT045 | Data Mining and Warehousing | DEC | 3 | 0 | 0 | 3 | 3 |
| 8 | 23IT046 | Ethics and AI | DEC | 3 | 0 | 0 | 3 | 3 |

## ELECTIVE 4: NETWORK & SECURITY

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23CS039 | Ethical Hacking | DEC | | 3 | 0 | 0 | 3 |
| 2 | 23CS040 | Digital and Mobile Forensics | DEC | | 3 | 0 | 0 | 3 |
| 3 | 23CS041 | Social Network Security | DEC | | 3 | 0 | 0 | 3 |
| 4 | 23CS042 | Information Security | DEC | | 3 | 0 | 0 | 3 |
| 5 | 23CS043 | High Performance Networks | DEC | | 3 | 0 | 0 | 3 |
| 6 | 23CS044 | Crypto currency and Blockchain Technology | DEC | | 3 | 0 | 0 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | 23CS045 | Protocols and Architectures for Wireless Sensor Networks | DEC | | 3 | 0 | 0 | 3 |
| 8 | 23CS046 | Mobile and Pervasive Computing | DEC | | 3 | 0 | 0 | 3 |

## VERTICAL 5: EMERGING TECHNOLOGIES

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23CS047 | Augmented Reality/Virtual Reality | DEC | 2 | 0 | 2 | 4 | 3 |
| 2 | 23CS048 | Quantum Computing | DEC | 2 | 0 | 2 | 4 | 3 |
| 3 | 23CS049 | Crypto currency and Blockchain Technologies | DEC | 2 | 0 | 2 | 4 | 3 |
| 4 | 23CS050 | Game Development | DEC | 2 | 0 | 2 | 4 | 3 |
| 5 | 23CS051 | UI and UX Design | DEC | 2 | 0 | 2 | 4 | 3 |
| 6 | 23CS052 | Internet of Things | DEC | 2 | 0 | 2 | 4 | 3 |
| 7 | 23CS053 | Computer Vision | DEC | 2 | 0 | 2 | 4 | 3 |
| 8 | 23CS054 | Robotic Process Automation | DEC | 2 | 0 | 2 | 4 | 3 |

## NON DEPARTMENT ELECTIVE – EMERGING TECHNOLOGY

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23NE971 | Quantum Technology | NEC | 3 | 0 | 0 | 3 | 3 |
| 2 | 23NE972 | Blockchain Technology | NEC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23NE973 | Big data Analytics | NEC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23NE974 | Augmented Reality / Virtual Reality | NEC | 3 | 0 | 0 | 3 | 3 |
| 5 | 23NE975 | Artificial Intelligence and Machine Learning Fundamentals | NEC | 3 | 0 | 0 | 3 | 3 |
| 6 | 23NE976 | IoT concepts and applications | NEC | 3 | 0 | 0 | 3 | 3 |
| 7 | 23NE977 | Data Science and Fundamentals | NEC | 3 | 0 | 0 | 3 | 3 |
| 8 | 23NE978 | Remote Sensing Concepts | NEC | 3 | 0 | 0 | 3 | 3 |
| 9 | 23NE979 | Urban Agriculture | NEC | 3 | 0 | 0 | 3 | 3 |
| 10 | 23NE980 | Electric Vehicle Technology | NEC | 3 | 0 | 0 | 3 | 3 |
| 11 | 23NE981 | Nano Technology | NEC | 3 | 0 | 0 | 3 | 3 |
| 12 | 23NE982 | Functional Materials | NEC | 3 | 0 | 0 | 3 | 3 |
| 13 | 23NE983 | Introduction to Renewable Energy systems | NEC | 3 | 0 | 0 | 3 | 3 |
| 14 | 23NE984 | Integrated Energy planning for sustainable Development | NEC | 3 | 0 | 0 | 3 | 3 |

## NON DEPARTMENT ELECTIVE – MANAGEMENT COURSES

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23HS971 | Total Quality Management | NEC | 3 | 0 | 0 | 3 | 3 |
| 2 | 23HS972 | Engineering Economics and Financial Accounting | NEC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23HS973 | Engineering Management and Law | NEC | 3 | 0 | 0 | 3 | 3 |
| 4 | 23HS974 | Knowledge Management | NEC | 3 | 0 | 0 | 3 | 3 |
| 5 | 23HS975 | Industrial Management | NEC | 3 | 0 | 0 | 3 | 3 |
| 6 | 23HS976 | Entrepreneurship and Business Opportunities | NEC | 3 | 0 | 0 | 3 | 3 |
| 7 | 23HS977 | Modern Business Administration and Financing | NEC | 3 | 0 | 0 | 3 | 3 |
| 8 | 23HS978 | Essentials of Management | NEC | 3 | 0 | 0 | 3 | 3 |

## NON DEPARTMENT ELECTIVE – SAFETY RELATED COURSES

| SL. NO | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1 | 23HS979 | Disaster Management | NEC | 3 | 0 | 0 | 3 | 3 |
| 2 | 23HS980 | Industrial Safety | NEC | 3 | 0 | 0 | 3 | 3 |
| 3 | 23HS981 | Automotive Safety | NEC | 3 | 0 | 0 | 3 | 3 |

## SEMESTER-WISE CREDIT DISTRIBUTION

| SEMESTER | HSMC | BSC | ESC | PCC | DEC | NEC | EEC | Total |
|---|---|---|---|---|---|---|---|---|
| **Semester I** | **5** | **11** | **6** | | | | | **22** |
| **Semester II** | **4** | **7** | **9** | **5** | | | | **25** |
| **Semester III** | **3** | **4** | | **18** | | | | **25** |
| **Semester IV** | | **4** | | **20** | | | **1** | **25** |
| **Semester V** | | | **2** | **9** | **6** | **3** | **2** | **22** |
| **Semester VI** | | | **5** | **7** | **6** | **3** | **3** | **24** |
| **Semester VII** | | | **2** | **4** | **6** | **3** | **5** | **20** |
| **Semester VIII** | | | | | | | **10** | **10** |
| **Total - curriculum-CSE** | **12** | **26** | **24** | **63** | **18** | **9** | **21** | **173** |

## SEMESTER – I

### 23IP101 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

**(i) Physical Activity**

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

**(ii) Life Skills**

Every student would choose one skill related to daily needs such as stitching, accounting, finance management, etc

**(iii) Universal Human Values**

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in

Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

**(iv) Club Activity**

Students will be introduced to more than 20 Clubs available in the college-both technical and non technical. The student can choose as to which club the student will enrol in .

**(v) Value Based Communication**

This module will focus on improving the communication skills of students

**(vi) Lectures by Alumni**

Lectures by alumni are arranged to bring in a sense of belonging to the student towards the institution and also to inspire them to perform better.

**(vii) Visits to Local Area**

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

**(viii) Familiarization to Dept./Branch & Innovations**

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

**(ix) Address by different heads**

Heads of Placement, Training, Student affairs, counsellor, etc would be interacting with the students to introduce them to various measures taken in the institution for the betterment of students.

**Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.**

**References:**

Guide to Induction program from AICTE

**23HS101 ESSENTIAL COMMUNICATION L T P C**
**3 0 0 3**

**COURSE OBJECTIVES:**

- To help learners extract information from short and simple correspondence
- To familiarize learners with different text structures by engaging them in reading, writing and grammar learning activities
- To help learners write coherent, short paragraphs and essays
- To enable learners to use language efficiently while expressing their opinions via various media.

**UNIT-I FORMATION OF SENTENCES 9**

**Reading**- Read pictures-notices- short comprehension passages and recognize main ideas and specific details. **Writing**- framing simple and compound sentences, completing sentences, developing hints, writing text messages. **Language development**- Parts of Speech, Wh- Questions, yes or no questions, direct and indirect questions. **Vocabulary development**– prefixes- suffixes- articles – countable and uncountable nouns

**UNIT-II NARRATION AND DESCRIPTION 9**

**Reading** – Read short narratives and descriptions from newspapers, dialogues and conversations. Reading strategies and practices. **Language development** – Tenses- simple present, present continuous, present perfect, simple past, past continuous, past perfect, simple future, future continuous, past participle, pronouns. **Vocabulary development**- guessing meanings of words in context. **Writing** – Write short narrative paragraphs, biographies of friends/relatives - writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures.

**UNIT-III COMPARING AND CONTRASTING 9**

**Reading**- short texts and long texts -understanding different types of text structures, -coherence-jumbled sentences. **Language development**- degrees of comparison, concord- **Vocabulary development** – single word substitutes-discourse markers- use of reference words **Writing** - comparative and contrast paragraphs writing- topic sentence- main idea, free writing, compare and contrast using some suggested vocabulary and structures.

**UNIT-IV SOCIAL MEDIA COMMUNICATION 9**

**Reading** blogs, social media reviews, posts, comments, process description, **Language development** - relative clause, **Vocabulary development**- social media terms-words, abbreviations and acronyms **Writing**- -e-mail writing-conventions of personal email, descriptions for simple processes, critical online reviews, blog, website posts, commenting to posts

**UNIT-V ESSAY WRITING** **9**

**Reading**- Close reading non-technical longer texts **Language development** - modal verbs, phrasal verbs- **Vocabulary development** - collocation. **Writing**- Writing short essays- brainstorming – developing an outline- identifying main and subordinate ideas

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

After completion of the course, the students should be able to

- **CO1:** Summarize simple, level-appropriate texts of around 300 words recognizing main ideas and specific details.
- **CO2:** Demonstrate the understanding of more complex grammatical structures and diction while reading and writing
- **CO3:** Use appropriate expressions to describe, compare and contrast people, things, situations etc., in writing
- **CO4:** Establish the ability to communicate effectively through emails
- **CO5:** Determine the language use appropriate for different social media platforms

**TEXT BOOKS:**


1. Susan Proctor, Jack C. Richards, Jonathan Hull. Interchange Level 2. Cambridge University Press and Assessment
2. Susan Proctor, Jack C. Richards, Jonathan Hull. Interchange Level 3. Cambridge University Press and Assessment


**REFERENCES :**


1. Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013
2. Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. CengageLearning , USA: 2007


| COs | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| 1 | - | - | - | - | - | 1 | 1 | - | 2 | 3 | - | 2 | - | - | - |
| 2 | - | - | - | - | - | - | - | - | 2 | 3 | - | 2 | - | - | - |
| 3 | | | | - | - | 1 | 1 | - | 2 | 3 | - | 2 | - | - | - |
| 4 | - | - | - | - | - | - | - | - | - | 3 | - | 2 | - | - | - |
| 5 | - | - | - | - | - | 1 | 1 | - | 3 | 3 | - | 2 | - | - | - |
| Overall correlation | | | | | | 1 | 1 | | 3 | 3 | - | 2 | - | - | - |

**23MA101 MATRICES AND CALCULUS L T P C**
**3 0 0 3**

**OBJECTIVES:**

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

**UNIT-I MATRICES 9**

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

**UNIT-II DIFFERENTIAL CALCULUS 9**

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

**UNIT-III FUNCTIONS OF SEVERAL VARIABLES 9**

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 – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

**UNIT-IV INTEGRAL CALCULUS 9**

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-V MULTIPLE INTEGRALS** **9**

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.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

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

- **CO1:** Apply the matrix algebra techniques and applications in Engineering Problems.
- **CO2:** Use both the limit definition and rules of differentiation to differentiate functions.
- **CO3:** Apply differentiation to solve maxima and minima problems.
- **CO4:** Evaluate integrals by using Riemann sums, Fundamental Theorem of Calculus and techniques of integration such as substitution, partial fractions and integration by parts.
- **CO5:** Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

**TEXT BOOKS:**

1. Kreyszig. E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - 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. Dr.P.Sivaramakrishnadas, Dr.C.Vijayakumari., " Matrices and Calculus" Pearson Publications

2. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016

3. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

4. Narayanan. S. and Manicavachagom Pillai.T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

| COs | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| **2** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **3** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **4** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **5** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **Overall correlation** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |

**23CS101 PROGRAMMING IN C L T P C**
**3 0 0 3**

**COURSE OBJECTIVES:**

- To understand the constructs of C Language.
- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop modular applications in C using functions
- To develop applications in C using pointers and structures
- To do input/output and file handling in C

**UNIT-I BASICS OF C PROGRAMMING 9**

Introduction to programming paradigms – Applications of C Language - Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Preprocessor directives - Compilation process

**UNIT-II ARRAYS AND STRINGS 9**

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

**UNIT-III FUNCTIONS AND POINTERS 9**

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

**UNIT-IV STRUCTURES AND UNION 9**

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

**UNIT -V FILE PROCESSING 9**

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

**COURSE OUTCOMES:**

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

- **CO1**: Develop simple applications in C using basic constructs (K3)
- **CO2**: Design and implement applications using arrays and strings (K3)
- **CO3**: Develop and implement modular applications in C using functions. (K3)
- **CO4:** Develop applications in C using structures and pointers. (K3)
- **CO5**: Design applications using sequential and random access file processing. (K3)

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

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

**REFERENCES:**

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

| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | - | 2 | - | 1 | 3 | 2 | 2 |
| **2** | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | - | 2 | - | 1 | 3 | 2 | 2 |
| **3** | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | - | 2 | - | 1 | 3 | 2 | 2 |
| **4** | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | - | 2 | -- | 1 | 3 | 2 | 2 |
| **5** | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | - | 2 | | 1 | 3 | 2 | 2 |
| **Overall Correlation** | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | - | 2 | - | 1 | 3 | 2 | 2 |

**23HS102 HERITAGE OF TAMILS L T P C**
**1 0 0 1**

**COURSE OBJECTIVES:**

- To explain to students the classical literature of Tamil language and define the contribution of Tamil poets and the development of modern literature
- To Summarize the making of musical instruments related to Tamil heritage
- To Illustrate to students the sports and games of Tamils
- To make students Recall the education and literacy during sangam age
- To make students realize the importance and contribution of Tamils to Indian Freedom Struggle

**UNIT-I LANGUAGE AND LITERATURE 3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature-Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

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

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

**UNIT-III FOLK AND MARTIAL ARTS 3**

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

**UNIT-IV THINAI CONCEPT OF TAMILS 3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature-Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

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

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

**TOTAL: 15 PERIODS**

**COURSE OUTCOMES:**

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

- **CO1** explain the classical literature of Tamil language and define the contribution of Tamil poets and the development of modern literature
- **CO2** Summarize the making of musical instruments related to Tamil heritage
- **CO3** Illustrate the sports and games of Tamils
- **CO4** Recall the education and literacy during Sangam age
- **CO5** Realize the importance and contribution of Tamils to Indian Freedom Struggle

**TEXT BOOKS:**

1. தமிழக வரலாறு–மக்களும் பண்பாடும்–கே.கேபிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம் ).
2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).

**REFERENCE BOOKS**

1. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
2. பொருனை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

| CO | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **2** | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **3** | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **4** | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **5** | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |
| **Overall correlation** | - | - | - | - | - | 1 | 1 | **1** | - | - | - | - | - | - | - |

| 23PH111 | ENGINEERING PHYSICS | L | T | P | C |
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**COURSE OBJECTIVES**

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

**UNIT-I MECHANICS** **9**

Types of Stress, Stress-strain diagram and its uses — factors affecting elastic modulus and tensile strength. — Bending of beams, bending moment - Uniform and non-uniform bending: theory and experiment. Center of mass (CM) – CM of continuous bodies - rod – motion of the CM. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of MI– moment of inertia of a rod, disc, and solid sphere– M.I of a diatomic molecule – torque-rotational energy state of a rigid diatomic molecule – M.I of disc by torsional pendulum.

**UNIT-II ELECTROMAGNETIC WAVES** **9**

Concept of field- Introduction to Gradient, divergence and Curl of Field- Stokes Theorem (no proof)-Gauss Divergence Theorem(no Proof)-The Maxwell's equations in Integral form and Differential form - wave equation; Plane electromagnetic waves in vacuum - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - Energy and momentum in EM waves – Poyntings vector – cellphone reception.

**UNIT-III OPTICS AND LASERS** **9**

Reflection and refraction of light waves - total internal reflection – types of optical fibers – numerical aperture and acceptance angle - interference –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients (qualitative )- population inversion - CO2 laser, semiconductor laser (homojunction) –Basic applications of lasers in industry.

**UNIT-IV BASIC QUANTUM MECHANICS** **9**

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

**UNIT-V APPLIED QUANTUM MECHANICS** **9**

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

**TOTAL : 45 PERIODS**

**PRACTICAL EXERCISES: (Any Seven Experiments)**

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending- Determination of Young's modulus
4. Uniform bending–Determination of Young's modulus
5. Laser-Determination of the wavelength of the laser using grating
6. Airwedge- Determination of thickness of a thinsheet /wire
7. a) Optical fibre-Determination of Numerical Aperture and acceptance angle
   b) Compact disc-Determination of width of the groove using laser.
8. Acoustic grating-Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer–determination of the velocity of sound and compressibility of liquids
10. Post office box-Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

**TOTAL: 30 PERIODS**

**Course Outcomes**

After completion of this course, the students should be able to

- **CO1:** Identify the elastic and plastic behavior of the material and behavior of the material and build the importance of mechanics.
- **CO2:** Develop the knowledge in electromagnetic waves.
- **CO3**: Make use of the optical properties to determine the thickness of thin wire and to determine the characteristics of optical fiber.

- **CO4**: Apply the quantum mechanical properties of particles and waves.
- **CO5:** Apply quantum mechanical principles towards the formation of energy bands.

**TEXT BOOKS:**

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

**REFERENCES:**

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.

| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
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| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 3 | 3 | - | - | - | 2 | - | - | - | - | 1 | - | - | - |
| **2** | 3 | 3 | 2 | - | - | - | 2 | - | - | - | - | 1 | - | - | - |
| **3** | 3 | 3 | 1 | - | - | - | 1 | - | - | - | - | 1 | - | - | - |
| **4** | 3 | 2 | 1 | - | - | - | 1 | - | - | - | - | 1 | - | - | - |
| **5** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Overall correlation** | 3 | 3 | 2 | - | - | - | 1 | - | - | - | - | 1 | - | - | - |

| 23CY111 | ENGINEERING CHEMISTRY | L | T | P | C |
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| | | 3 | 0 | 2 | 4 |

**COURSE OBJECTIVES:**

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and Combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

**UNIT-I WATER AND ITS TREATMENT** **9**

Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Sewage treatment primary treatment and disinfection (UV, Ozonation, break-point chlorination). Hardness-Estimation of Hardness of water by EDTA-numerical Problems-Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

**UNIT- II NANO CHEMISTRY** **9**

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, lectrical, mechanical and magnetic); Types of nanomaterials (Metal oxide and Metal) Synthesis and Characterization of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, energy, sensor , electronics and catalysis**.**

**UNIT-III PHASE RULE AND COMPOSITES** **9**

Phase rule: Introduction, definition of terms with examples. One component system – water system; CO2 system; Reduced phase rule; Two component system: lead-silver system – Pattinson process.

Composites: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites – definition and examples.

**UNIT-IV FUELS AND COMBUSTION** **9**

Fuels: Fossil Fuels, Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking – octane number, diesel oil – cetane number; 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. CO2 emission and carbon sequestration, Green Hydrogen.

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

Nuclear fission and fusion- light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery – dry cell, Secondary battery – lead acid battery and lithium-ion battery; Electric vehicles – working principles; Fuel cells: H2-O2 fuel cell, microbial fuel cell and its advanced technology, supercapacitor

**TOTAL: 45 PERIODS**

**PRACTICAL EXERCISES:** **30 PERIODS**

1. Determination of hardness causing salts in water sample by EDTA method.
2. Determination of alkalinity in water sample
3. Determination of chloride content of water sample by argentometric method
4. Determination of strength of given Barium chloride using conductivity meter
5. Determination of strength of Acid using pH meter
6. Determination of strength of FAS by potentiometer
7. Determination of strength of acids in a mixture using conductivity meter.
8. Preparation of nanoparticles (TiO2/ZnO/CuO) by Sol-Gel method.
9. Estimation of Nickel in steel

**COURSE OUTCOMES:**

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

- **CO1**: To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water
- **CO2**: To identify the apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications
- **CO3**: To apply the knowledge of phase rule and composites for material selection requirements
- **CO4**: To recommend suitable fuels for engineering processes and applications

- **CO5:** To recognize different forms of energy resources and apply them for suitable applications in energy sectors

**TEXTBOOKS:**


1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.


**REFERENCES:**


1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.


| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
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| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 2 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |
| **2** | 2 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |
| **3** | 2 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |
| **4** | 2 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |
| **5** | 2 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |
| **Overall correlation** | 2 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |

**23CS121 C PROGRAMMING LABORATORY L T P C**
**0 0 4 2**

**OBJECTIVES:**

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

**LIST OF EXPERIMENTS:**

1. I/O statements, operators, expressions
2. Decision-making constructs: if-else, goto, switch-case, break-continue
3. Loops: for, while, do-while
4. Arrays: 1D and 2D, Multi-dimensional arrays, traversal
5. Strings: operations
6. Functions: call, return, passing parameters by (value, reference), passing arrays to function.
7. Recursion
8. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
9. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
10. Files: reading and writing, File pointers, file operations, random access, processor directives.

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES:**

- **CO1**: Develop programs in C using basic constructs. (K3)
- **CO2**: Develop programs in C using arrays. (K3)
- **CO3**: Develop applications in C using strings, pointers, functions. (K3)
- **CO4**: Develop applications in C using structures. (K3)
- **CO5**: Develop applications in C using file processing. (K3)

| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 2 | 3 | 2 | 3 | 1 | - | 1 | - | 2 | - | 1 | 3 | 3 | 2 |
| **2** | 3 | 2 | 3 | 2 | 3 | 1 | - | 1 | - | 2 | - | 1 | 3 | 3 | 2 |
| **3** | 3 | 2 | 3 | 2 | 3 | 1 | - | 1 | - | 2 | - | 1 | 3 | 3 | 2 |
| **4** | 3 | 2 | 3 | 2 | 3 | 1 | - | 1 | - | 2 | - | 1 | 3 | 3 | 2 |
| **5** | 3 | 2 | 3 | 2 | 3 | 1 | - | 1 | - | 2 | - | 1 | 3 | 3 | 2 |
| **Overall correlation** | 3 | 2 | 3 | 2 | 3 | 1 | - | 1 | - | 2 | - | 1 | 3 | 3 | 2 |

**23HS121 COMMUNICATION SKILLS LABORATORY L T P C**
**0 0 2 1**

**COURSE OBJECTIVES:**

- To enable the students to comprehend the main idea and specific information of the listening passage
- To help students express themselves clearly, and communicate effectively with others.
- To introduce authentic language use and context-specific vocabulary that might not be encountered in textbooks.

**Exercise: 1** Listening to conversations set in everyday social context and complete gap-filling exercise

**Exercise: 2** Listening to a monologue in everyday social context. Diagram labelling and MCQ

**Exercise: 3** Listening to a group conversation in academic setting and answer MCQ

**Exercise: 4** Listening to a lecture and answer MCQ or gap filling

**Exercise: 5** Listening to Ted Talks, podcasts, documentaries - discussion

**Exercise 6** Listening to a lecture and reading a text on same subject- compare and contrast

**Exercise:** 7 Speaking introducing oneself

**Exercise: 8** Answering questions based on the introduction

**Exercise: 9** Speaking on a given prompt for 2 mins.

**Exercise: 10** Answering questions based on the topic spoken

**Exercise: 11** Role play- Engaging in conversation

**Exercise: 12** Engaging in Podcast Discussion

**TOTAL PERIODS: 25**

**COURSE OUTCOMES**

- **CO1:** Demonstrate fluency in speaking in variety of situations
- **CO2:** Express their knowledge by talking continuously for more than two minutes on a topic
- **CO3**: Use a full range of structures naturally and appropriately
- **CO4:** Use a full range of structures naturally and appropriately
- **CO5:** Identify the specific information in conversations, interviews, talks and lectures

## LEARNING SOFTWARE LINK

## M/s. Orell Techno Systems (India) Pvt Ltd.

| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| 1 | - | - | - | - | - | 1 | 1 | - | 2 | 3 | - | 2 | - | - | - |
| 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 3 | - | - | - | - | - | - | 1 | - | - | - | - | 2 | - | - | - |
| 4 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 5 | - | - | - | - | - | - | 1 | - | - | - | - | 2 | - | - | - |
| Overall correlation | - | - | - | - | - | 1 | 1 | - | 3 | 3 | - | 2 | - | - | - |

**23CS122 COMPUTATIONAL THINKING** **L T P C**

**0 0 2 1**

**OBJECTIVES:**

- To formulate problems in a way that enables the use of a computer to solve them.
- To logically organize and analyze data.
- To automate solutions through algorithmic thinking.
- To identify and implement possible solutions with the goal of achieving the most efficientand effective combination of steps and resources.
- To generalize and transfer this problem solving process to wide variety of problems

**MODULE I INTRODUCTION TO ALGORITHMS** **10**

Algorithmic thinking - Data abstraction and representation - Abstraction and translation of everyday data for use on a computer - Decomposing a complex problem

**Suggested Activities:**

- Explore algorithm design by creating oral algorithms.
- Abstract the essential details of everyday objects.
- Translate the description of everyday objects into data types and variables.
- Decompose a complex problem into discrete steps

**Suggested Evaluation Methods:**

- Evaluation of the oral algorithms and computer data.

**MODULE II PROGRAMMING** **10**

Strategies for decomposition and algorithm design - Divide and Conquer - Simple program implementations - Overall data representation, abstraction and algorithm design - Program implementations

**Suggested Activities:**

- Design a simple algorithm for solving the problem.
- External learning: Study of different strategies for decomposition and algorithm design.
- Examine sample input and expected output and develop strategies to decompose the problem.
- Use decomposition to break the problem into smaller problems and algorithmic design to plan asolution strategy.
- External learning: Simple program implementations.
- Examples of Data representation, abstraction, analysis and algorithm design

**Suggested Evaluation Methods:**

- Whiteboard presentations of the decomposition and algorithm.
- Evaluation of the developed strategies.
- Whiteboard presentations of the Data analysis and Algorithm design
- Demonstration of the implemented programs.

**MODULE III COMPUTATIONAL THINKING 10**

Application of computational thinking to simple real world problems - program implementation of decomposed modules.

**Suggested Activities:**

- Application to simple real-world problems.

**Suggested Evaluation Methods:**

- Evaluation of the solutions to the real world problems

**TOTAL : 30 PERIODS**

**REFERENCES:**

1. Exploring Computational Thinking.

https://edu.google.com/resources/programs/exploring-computational-thinking/

**OUTCOMES:**

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

CO1: Formulate problems in a way that enables the use of a computer to solve them. (K3)
CO2: Logically organize and analyze data. (K3)
CO3: Automate solutions through algorithmic thinking. (K3)
CO4: Identify and implement possible solutions with the goal of achieving the most efficient and effective combination of steps and resources. (K3)
CO5: Generalize and transfer the problem solving process to wide variety of problems. (K3)

## SEMESTER – II

**23HS201 PROFESSIONAL ENGLISH** **L T P C**
**3 0 0** 3

**COURSE OBJECTIVES:**

- To help learners extract information from longer, technical and scientific texts
- To familiarize learners with different text structures by engaging them in reading, writing and grammar learning activities
- To help learners write coherent, extensive reports and essays.
- To enable learners to use language efficiently while expressing their opinions in professional and business situations

**UNIT-I WORKPLACE COMMUNICATION** **9**

**Reading** – Reading brochures (technical context), advertisements, telephone messages, gadget reviews social media messages, digital communication relevant to technical contexts and business. **Writing –** Writing emails -emails on professional contexts including introducing oneself, writing checklist, writing single sentence definition, product description- advertising or marketing slogans, **Language Development**– Tenses, Concord, Question types: Wh/ Yes or No/ and Tags, imperative sentences, omplex sentences**. Vocabulary** One-word substitutes; Abbreviations & Acronyms as used in technical contexts and social media.

**UNIT- II EXPRESSING CAUSE AND EFFECT** **9**

**Reading -** Reading longer technical texts– Cause and Effect Essays, and emails of complaint. **Writing** - writing complaint emails (raising tickets) and responses to complaints, writing Cause and effect paragraphs and essays. **Language Development**– Active, Passive and Impersonal Passive Voice transformations, Infinitive and Gerunds **Vocabulary** – Synonyms- contextual meaning of words, Same word acting as different parts of speech, causal expressions

**UNIT-III PROVIDING SOLUTIONS TO PROBLEMS** **9**

**Reading** - Case Studies, editorials, news reports etc. Writing – Letter to the Editor, Writing instructions and recommendations, Problem solution essay / Argumentative Essay, **Language Development** – Error correction; If conditional sentences **Vocabulary** - Compound Words, discourse markers

**UNIT-IV INTERPRETATION OF GRAPHICS** **9**

**Reading** newspaper articles, nonverbal communication (charts and graphs,) **Writing** –Transferring information from nonverbal (chart, graph etc, to verbal mode) Process

description. **Language development**–Possessive & Relative pronouns, numerical adjectives **Vocabulary** Homonyms and Homophones, sequence words

**UNIT-V REPORT WRITING AND RESUME WRITING 9**

**Reading** – Company profiles, journal reports. **Language Development**– Reported Speech **Vocabulary**-reporting words and phrases.**Writing** accident report, survey report and progress report, project proposal, minutes of the meeting, writing statement of purpose, internship application and resume.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

After completion of the course, the students should be able to

- **CO1:** Summarize long technical and scientific text of not less than 500 words recognizing main ideas and specific details.
- **CO2:** Demonstrate the understanding of more complex grammatical structures and diction while reading and writing
- **CO3:** Use appropriate expressions to describe process and product, compare and contrast data, analyze problems, provide solutions and prove an argument in writing
- **CO4:** Establish the ability to communicate effectively in professional environment through emails and reports
- **CO5:** Determine the language use appropriate for different social media platforms used for digital marketing

**Text Book:**

1. V. Chellammal, Deepa Mary Francis, K N Shoba, P R Sujatha Priyadharshini, Veena Selvam, English for Science & Technology I, Cambridge University Press and Assessment

2. V. Chellammal, Deepa Mary Francis, K N Shoba, P R Sujatha Priyadharshini, Veena Selvam, English for Science & Technology II, Cambridge University Press and Assessment

**References:**


1. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
2. Developing Communication Skills by Krishna Mohan, Meera Bannerji-Macmillan India Ltd. 1990, Delhi.

| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
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| 5 | - | - | - | - | - | - | 1 | - | - | - | - | 2 | - | - | - |
| Overall correlation | - | - | - | - | - | 1 | 1 | - | 3 | 3 | - | 2 | - | - | - |

| 23MA204 | PROBABILITY AND STATISTICS | L | T | P | C |
|---|---|---|---|---|---|
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**COURSE OBJECTIVES:**

This course aims

- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of Estimation Theory for small and large samples this plays an important role in real life problems.
- To provide required advanced statistical tools in solving engineering problems.
- To introduce the basic concepts of classifications of statistical quality control this plays very important roles in the field of agricultural engineering.

**UNIT-I PROBABILITY AND RANDOM VARIABLES 12 + 4**

Axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

**UNIT-II TWO- DIMENSIONAL RANDOM VARIABLES 9 + 3**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Curve Fitting-Method of Least Squares-Central limit theorem (for independent and identically distributed random variables,without proof)- Simple problems.

**UNIT-III ESTIMATION THEORY 9 + 3**

Unbiased estimators - Efficiency - Consistency - Sufficiency - Robustness - Method of moments - Method of maximum Likelihood - Interval estimation of Means - Differences between means.

**UNIT-IV NON- PARAMETRIC TESTS 9 + 3**

Introduction - The Sign test - The Signed - Rank test - Rank - sum tests - The U test - The H test- Tests based on Runs - Test of randomness - The Kolmogorov Tests .

**UNIT-V STATISTICAL QUALITY CONTROL 6 + 2**

Control charts for measurements ($\overline{X}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES:**

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

- **CO1:** Apply the fundamental knowledge of the concepts of probability and one

dimensional random variables and standard probability distributions which can describe real life phenomenon.

- **CO2:** Apply the basic concepts of two dimensional random variables in engineering applications.
- **CO3:** Apply the concept of estimation theory for small and large samples in real life problems.
- **CO4:** Apply the notion of sampling distributions and statistical techniques used in engineering and management problems.
- **CO5:** Apply the basic concepts of classifications of statistical quality control in the field of engineering.

**TEXT BOOKS**


1. Johnson. R.A., Miller. I.R and Freund . J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata Mc Graw Hill, 4th Edition, 2007.


**REFERENCES:**


1. Dr.P. Sivaramakrishna Das, C. Vijayakumari, "A text book of probability and statistics", Pearson Publications.
2. Gupta. S.C. and Kapoor. V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
3. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
4. Ross. S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5thEdition, Elsevier, 2014.


| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| 1 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |
| 2 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |
| 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |
| 4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |
| 5 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |
| Overall correlation | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |

**23PH205 PHYSICS FOR INFORMATION SCIENCE L T P C**

**3 0 0 3**

**COURSE OBJECTIVES:**

- To make the students understand the importance in studying electrical properties of materials.
- To enable the students to gain knowledge in semiconductor physics
- To instill knowledge on magnetic properties of materials.
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

**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 (qualitative) – Hall effect and devices – Ohmic contacts – Schottky diode – introduction to solid state drive (SSD)

**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 NANODEVICES AND QUANTUM COMPUTING 9**

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots –– band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade - resonant- tunneling diode – single electron transistor – quantum cellular automata - Quantum system for information processing - quantum states – classical bits – quantum bits or qubits –CNOT gate - multiple qubits – Bloch sphere – quantum gates – advantage of quantum computing over classical computing.

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES:**

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

- **CO1:** Apply the knowledge of classical and quantum electron theories toenergy band structures.
- **CO2:** Utilize the basics of intrinsic and extrinsic semiconductor physicsand its application in various devices.
- **CO3:** Apply the magnetic properties of materials apply to explain data storage devices.
- **CO4:** Utilize electro optical properties to model optoelectronic devices.
- **CO5:** Utilize the quantum structures and quantum confinement to model nano devices and apply qubits to quantum computing and quantum logic gates

**TEXT BOOKS:**


1. Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007.
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
3. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

**REFERENCES:**


1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge Univ.Press, 2008.
4. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
5. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.


| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
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| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **2** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **3** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **4** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **5** | 3 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | - | - |
| **Overall correlation** | 3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | 1 | - | - |

**23CS201 DATA STRUCTURES USING C L T P C**
**3 0 0 3**

**COURSE OBJECTIVES:**

- To understand the concepts of ADTs.
- To Learn linear data structures – lists, stacks, and queues.
- To understand non-linear data structures – trees and graphs.
- To understand sorting, searching and hashing algorithms.
- To apply Tree and Graph structures.

**UNIT-I LISTS 9**

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT.

**UNIT-II STACKS AND QUEUES 9**

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion –Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

**UNIT-III TREE STRUCTURES 9**

Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT –Priority Queue (Heaps) – Binary Heap-Multiway Search Trees - B-Tree – B+ Tree.

**UNIT-IV SORTING AND SEARCHING 9**

Sorting – Bubble sort – Selection sort – Insertion sort –Merge Sort – Quick Sort –Shell sort — Radix sort. Searching – Linear Search – Binary Search.

**UNIT-V GRAPH STRUCTURES 9**

Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth-first traversal –– Bi-connectivity –Topological Sort – Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm.

**COURSE OUTCOMES:**

- **CO1**: Define linear and non-linear data structures.
- **CO2**: Implement linear and non–linear data structure operations.
- **CO3**: Use appropriate linear/non–linear data structure operations for solving a given problem.
- **CO4**: Apply appropriate graph algorithms for graph applications.
- **CO5**: Analyze the various searching and sorting algorithms.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2005.
2. Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007

**REFERENCES:**

1. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.

3. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002.
4. Kruse, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.

**23HS203 TAMILS AND TECHNOLOGY L T P C**
**1 0 0 1**

**COURSE OBJECTIVES:**

- To summarize the weaving industry and ceramic technology during Sangam Age
- To explain the design and construction of houses during Sangam Age and the sculptures and temples of Chola,Pallava and Pandya period
- To Explain about the water bodies of Sangam age and relate it to the agricultural usage
- To Outline to students the agriculture and irrigation technology during the Chola Period
- To help students Interpret and explain the digitalization of Tamil books and development of Tamil software

**UNIT-I WEAVING AND CERAMIC TECHNOLOGY 3**

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

**UNIT-II DESIGN AND CONSTRUCTION TECHNOLOGY 3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples ofMamallapuram – Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**UNIT-III MANUFACTURING TECHNOLOGY 3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences – Gem stone types described in Silappathikaram.

**UNIT-IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean -

Knowledge Specific Society.

**UNIT-V SCIENTIFIC TAMIL & TAMIL COMPUTING 3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

**TOTAL : 15 PERIODS**

**COURSE OUTCOMES:**

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

- **CO1:** Summarize the weaving industry and ceramic technology during Sangam Age
- **CO2:** explain the design and construction of houses during Sangam Age and the sculptures and temples of Chola,Pallava and Pandya period
- **CO3:** Explain about the water bodies of Sangam age and relate it to the agricultural usage
- **CO4:** Outline the agriculture and irrigation technology during the Chola Period
- **CO5:** Interpret and explain the digitalization of Tamil books and development of Tamil software

**REFERENCES:**


1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).


| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
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| 3 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| 4 | - | - | - | - | - | - | | - | - | - | - | - | - | - | - |
| 5 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| Overall correlation | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |

**23EE281 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

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

**(Common to Aero, Aerospace, Mech, Auto, CSE, IT, AI &DS, Cyber Security)**

**COURSE OBJECTIVES:**

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics, functional elements and working of measuring instruments
- To demonstrate the load test on DC machines, working of PN Junction diodes, Zener diodes and rectifiers.

**UNIT-I ELECTRICAL CIRCUITS** **6**

DC Circuits:Circuit Components: Conductor, Resistor, Inductor, Capacitor– Ohm's Law-Kirchhoff's Laws -Nodal Analysis, Mesh analysis with independent sources only (Steadystate)- Introduction to AC Circuits –Steady state analysis of RL, RC, and RLC circuits (Simple problems only).

**UNIT-II ELECTRICAL MACHINE** **6**

Construction and Working principle of DC Generators, EMF equation, Types and Applications. Working Principle of DC motors,Torque Equation,Types and Applications. - Construction, Working principle and Applications of Single- Phase Transformer.

**UNIT-III ANALOG ELECTRONICS** **6**

PN Junction Diodes, Zener Diode–Characteristics & Applications–Bipolar Junction Transistor, JFET, SCR, MOSFET, – Types, I-V Characteristics and Applications – Rectifier.

**UNIT-IV DIGITAL ELECTRONICS** **6**

Review of number systems, Combination allogic (adder and subtractor) – representation of logicfunctions-SOP and POS forms, K-map representations and minimization using K-maps (up to 3 variables).

**UNIT-V MEASUREMENTS AND INSTRUMENTATION 6**

Functional elements of an instrument, Standards and calibration, Operating Principle, types- Moving Coil and Moving Iron meters, InstrumentTransformers-CTand PT, DSO-Block diagram-Data acquisition.

**TOTAL:30 PERIODS**

**LAB COMPONENT 30 PERIODS**

1. Verification of Ohms and Kirchhoff's Laws.
2. Load test on DC Shunt Motor.
3. Characteristics of PN and Zener Diodes
4. Half Wave and Full Wave rectifiers
5. Implementation of Binary Adder and Subtractor
6. Study of DSO

**TOTAL: 30+30 = 60 PERIODS**

**COURSE OUTCOMES:**

After completing this course, the students will be able to

- **CO1:** Compute the electric circuit parameters for simple problems.
- **CO2:** Interpret the AC circuits and its steady state analysis.
- **CO3:** Illustrate the working principles of electrical machines and its application
- **CO4:** Explain various Analog devices and its V-I characteristics
- **CO5:** Summarize number systems, combinational logic, k maps in digital electronics and functional elements and working principle of measuring instruments

**TEXT BOOKS:**


1. KothariD P and I.J Nagrath,"Basic Electrical and Electronics Engineering" , Second Edition, McGraw Hill Education,2020
2. SedhaR.S.,"A textbook book of Applied Electronics", S.Chand & Co.,2008
3. A.K.Sawhney, Puneet Sawhney'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Raiand Co, 2015.


**REFERENCES:**


1. Kothari D P and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, Mc Graw Hill Education, 2019.
2. S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3. Thomas L.Floyd,' Digital Fundamentals', 11th Edition, Pearson Education,2017.

4. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
5. Mahmood Nahvi and Joseph A.Edminister, "Electric Circuits", Schaum 'Outline Series, McGraw Hill, 2002.
6. H.S.Kalsi, 'Electronic Instrumentation' , Tata McGraw-Hill, NewDelhi, 2010
7. JamesA. Svoboda, Richard C.Dorf,"Dorf's Introduction to Electric Circuits", Wiley, 2018.

**MAPPING OF COs WITH POs AND PSOs**

| COs | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| 1 | 3 | 1 | 1 | - | - | 2 | | 1 | - | - | - | 1 | 3 | - | 1 |
| 2 | 2 | 1 | 1 | - | - | 2 | | 1 | - | - | - | 1 | 2 | - | 1 |
| 3 | 2 | 1 | 1 | - | - | 1 | 1 | 1 | - | - | - | 1 | 2 | - | 1 |
| 4 | 2 | 1 | 1 | - | - | 1 | 1 | 1 | - | - | - | 1 | 2 | - | 1 |
| 5 | 2 | 1 | 1 | - | - | | | 1 | - | - | - | 1 | 2 | - | 1 |
| Overall correlation | 3 | 1 | 1 | - | - | 1 | 1 | 1 | - | - | - | 1 | 3 | - | 1 |

| 23ME211 | ENGINEERING GRAPHICS | L T P C |
|---|---|---|
| | (Common to all Departments) | 3 0 2 4 |

**COURSE OBJECTIVES:**

The learning objective of this course is to

- Gain a solid foundation in the fundamental principles and concepts of engineering graphics, including conic sections, orthographic projection, isometric projection, section views and development of surfaces, perspective projection, and dimensioning.
- Develop graphic skills for communication of concepts, ideas and design of engineering products.
- Gain knowledge on drafting software to construct part models.
- Familiarize with existing national standard practices and conventions related to technical drawings.
- Enhance the ability to visualize objects in three dimensions and translate them into 2D representations.

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

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** **9 + 6**

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.

**LIST OF EXERCISES:**

1. Drawing of a title block with necessary text, projection symbol and lettering using drafting software.
2. Drafting of Conic curves - Ellipse, Parabola and Hyperbola.

**UNIT-II PROJECTION OF POINTS, LINES AND PLANE SURFACE** **9+6**

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. Projection of planes (hexagonal and pentagonal planes only) inclined to both the principal planes by rotating object method.

**LIST OF EXERCISES:**

1. Draw the projection of points when it is placed in different quadrants
2. Draw the projection of lines when it is placed in first quadrant
3. Draw the planes when it is placed in first quadrant

**UNIT-III PROJECTION OF SOLIDS AND FREE HAND SKETCHING 9+6**

Projection of simple solids - hexagonal prism, pentagonal pyramid and cone inclined to the horizontal plane by rotating object method. Free Hand sketching: Visualization principles - Representation of Three Dimensional objects - Layout of views - Free hand sketching of multiple views from pictorial views of objects

**LIST OF EXERCISES:**

1. Practicing three dimensional modeling of simple objects.
2. Drawing of orthographic views from the given pictorial diagram.

**UNIT-IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 9+6**

Sectioning of hexagonal prism, pentagonal pyramid and cone when the cutting plane is inclined to the horizontal plane, Development of lateral surfaces of simple and sectioned solids – hexagonal prism and cone cut by a plane inclined to horizontal plane only.

**LIST OF EXERCISES:**

1. Draw the sectioned views of prisms and pyramids
2. Draw the development of hexagonal prism cut by a section plane inclined to the horizontal plane

**UNIT-V ISOMETRIC PROJECTION 9+6**

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

**LIST OF EXERCISES:**

1. Drawing Isometric view and projection of simple solids.
2. Drawing three dimensional modeling of isometric projection of combination of solids.

**Total: 75 Periods**

**COURSE OUTCOMES:**

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

- **CO1:** Construct the conic curves, involutes and cycloids.
- **CO2:** Draw the orthographic projections of points, lines and plane surfaces.
- **CO3:** Draw the orthographic projections of simple solids.
- **CO4:** Draw the projections of sectioned solids and development of the lateral surfaces of solids.
- **CO5:** Sketch the isometric sections of solids.

**TEXT BOOKS:**

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.

2. Basant Agarwal and Agarwal C.M.,"Engineering Drawing", McGraw Hill, 2nd Edition, 2019

**REFERENCES:**

1. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.

3. 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.

4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015. 5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.

6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

**Publication of Bureau of Indian Standards:**

1. IS10711 - 2001: Technical products Documentation - Size and layout 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.

## CO – PO Mapping:

| COs | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **2** | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **3** | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **4** | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **5** | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| Overall correlation | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| **Low(1)** | **Medium(2)** | | | | **High(3)** | | | | | | | | | | |

## LIST OF EQUIPMENT FOR A BATCH OF 60 STUDENTS

| S. No. | Description of Equipment | Quantity |
|---|---|---|
| 1. | Computer nodes or systems with suitable graphics facility | 60 Nos. |
| 2. | Software for Drafting and Modelling | 60 Users |
| 3. | Laser Printer to print drawings | 1 No. |

**23ME221 ENGINEERING PRACTICES LABORATORY L T P C**
**(Common to all Departments) 0 0 4 2**

**COURSE OBJECTIVES:**

The learning objective of this course is to

- Familiarize students with basic engineering tools and equipment.
- Educate students on the importance of safety practices, including proper handling of equipment, adherence to safety protocols, and understanding potential hazards in the laboratory environment.
- Develop basic manufacturing and fabrication skills.
- Provide hands on training to the students in plumbing and wood working.
- Provide hands on training to the students in welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipment; Making a tray out of metal sheet using sheet metal work.
- Demonstrate the wiring and measurement methods in common household electrical applications.
- Study the basic electronic components, Gates and provide hands on training in soldering.

**GROUP A (CIVIL & MECHANICAL)**

**PART I CIVIL ENGINEERING PRACTICES 15**

**PLUMBING WORK:**

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b) Preparation of plumbing line sketches.
c) Laying pipe connection to the suction side of a pump
d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

**WOOD WORK:**

a) Sawing
b) Planing
c) Making of T-Joint, Mortise joint and Tenon joint and Dovetail joint.

**Wood Work Study:**

a) Study of joints in door panels and wooden furniture
b) Study of common industrial trusses using models.

**PART II MECHANICAL ENGINEERING PRACTICES 15**

**WELDING WORK:**

a) Study of Welding and its tools.
b) Welding of Butt Joints, Lap Joints and Tee Joints by metal arc welding.
c) Study of Gas Welding.

**BASIC MACHINING PRACTICE:**

a) Facing and Plain Turning
b) Taper Turning
c) Drilling and Tapping

**SHEET METAL WORK:**

a) Forming and Bending
b) Making of a square Tray

**MACHINE ASSEMBLY WORK:**

a) Study of Centrifugal Pump
b) Study of Air Conditioner

**FOUNDRY PRACTICE:**

a) Demonstration on Foundry operations like mould preparation.

**GROUP B (ELECTRICAL & ELECTRONICS)**

**PART III ELECTRICAL ENGINEERING PRACTICES 15**

1. Residential House wiring using Switches, Fuse, Indicators, Lamp and Energ Meter.
2. Staircase Wiring.
3. Fluorescent Lamp Wiring with Introduction to CFL and LED Types.
4. Measurement of Energy using Single Phase Energy Meter.
5. Study of Iron Box Wiring and Assembly
6. Study of Fan Regulator – Electronic Type

**PART IV ELECTRONICS ENGINEERING PRACTICES 15**

1. Study of Electronic components and equipment – Resistors, Colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR and NOT.

3. Generation of Clock Signal.
4. Soldering simple electronic circuits and checking continuity.
5. Study the elements of smart phone
6. Study of LED TV (Block diagram)

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES:**

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

- **CO1:** Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work.
- **CO2:** Use welding equipment to join the structures, perform the basic machining operations, make joints in wood materials and make the models using sheet metal works.
- **CO3:** Demonstrate on centrifugal pump, air conditioner and foundry operations.
- **CO4:** Demonstrate the Electrical wiring connections for household applications and study the working of Iron Box and Fan Regulator.
- **CO5:** Identify the basic electronic components and explain Gates and soldering techniques.

**CO – PO Mapping:**

| CO | PO | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| **1** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **2** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **3** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **4** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **5** | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 0 | 1 |
| Overall correlation | 3 | 2 | - | - | 1 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 |
| **Low (1) ; Medium (2) ; High (3)** | | | | | | | | | | | | | | | |

**23CS221 DATA STRUCTURES USING C LABORATORY L T P C**
**0 0 4 2**

**Course Objectives:**

- To demonstrate array implementation of linear data structure algorithms.
- To implement the applications using Stack.
- To implement the applications using Linked list
- To implement Binary search tree algorithms.
- To implement the Heap algorithm.
- To implement Dijkstras algorithm.
- To implement Prims algorithm
- To implement Sorting, Searching algorithms.

**List of Exercises:**

1. Array implementation of Stack, Queue and Circular Queue ADTs
2. Implementation of Singly Linked List.
3. Linked list implementation of Stack and Linear Queue ADTs.
4. Implementation of Polynomial Manipulation using Linked list.
5. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion.
6. Implementation of Heaps using Priority Queues
7. Implementation of Linear Search and Binary Search.
8. Implementation of Insertion Sort and Selection Sort.
9. Implementation of Quick Sort.
10. Implementation of Binary Search Trees
11. Implementation of Dijkstra's Algorithm
12. Implementation of Prim's Algorithm

**COURSE OUTCOMES: Data Structures Laboratory**

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

- **CO1:** Implement linear data structure algorithms.
- **CO2:** Implement applications using Stacks and Linked lists
- **CO3:** Implement Binary Search tree.
- **CO4:** Implement graph algorithms.
- **CO5:** Analyze the various searching and sorting algorithms.

**23HS221 SOFT SKILLS** **L T P C**
**0 0 2 1***

**COURSE OBJECTIVES:**

- To help learners improve their interpersonal skills and critical thinking
- To familiarize learners with the attributes of a leader to enhance team performance
- To prepare students to face job interviews
- To help learners to know the importance of ethics in work place

**UNIT-I INTERPERSONAL COMMUNICATION**

Basic communication- verbal and non-verbal communication; passive, assertive and aggressive communication; presentation skills; giving feedback and responding to feedback.

**UNIT- II TEAM WORK AND LEADERSHIP**

Vision- setting realistic goals and objectives, collaboration, cooperation, dependability, empathy, sympathy, motivation, delegation of responsibilities, open mindedness, creativity, flexibility, adaptability, cross cultural communication and group dynamics

**UNIT-III TIME MANAGEMENT AND STRESS MANAGEMENT**

Effective Planning, Planning activities at macro and micro levels, setting practical deadlines and realistic limits/targets, punctuality, prioritizing activities, spending the right time on the right activity, positive attitude, emotional intelligence, self-awareness and regulation

**UNIT-IV CRITICAL THINKING AND WORK ETHICS**

Questioning, analysing, inferencing, interpreting, evaluating, solving problems, explaining, self-regulation, open-mindedness, conflict management- ethical dilemmas, appearance, attendance, attitude, character, organizational skills, productivity, respect.

**UNIT-V INTERVIEW SKILLS AND RESUME BUILDING TECHNIQUES**

Telephonic interview, online interviews, f2f interviews, FAQ soft skills interview questions, drafting error-free CVs/ Resumes and Cover Letters, selecting the ideal format for resume, content drafting along with sequencing, art of representing one's qualifications and most relevant work history, video resume, website resume.

**TOTAL: 25 PERIODS**

**COURSE OUTCOMES:**

After completion of the course, the students should be able to

- **CO1:** Express their thoughts, opinions and ideas confidently to one or more people in spoken form
- **CO2:** Demonstrate knowledge and skills in a group as team player and leader
- **CO3:** Compose a comprehensive resume reflecting qualifications, exposure and achievements
- **CO4:** Exhibit knowledge and skills confidently during job interviews
- **CO5:** Demonstrate ethical and professional behaviour at workplace in all situations

**Text Book**


1. Soft Skills: Key to Success in Workplace and Life by Meenakshi Raman & Shalini Upadhyay. Cengage


**References**


2. English for Job Seekers (Language and Soft Skills for the Aspiring) by Geetha Rajeevan, C.L.N. Prakash ) Cambridge University Press pvt,Ltd.
3. Business Benchmark by Norman Whitby. Cambridge University Press pvt,Ltd


| CO Nos. | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| 1 | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - | - |
| 2 | - | - | - | - | - | - | - | - | 3 | 3 | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | - | 3 | 3 | - | - | - | - | - |
| 4 | - | - | - | - | - | - | - | - | 3 | 3 | - | - | - | - | - |
| 5 | - | - | - | - | - | - | - | - | 3 | 3 | - | - | - | - | - |
| Overall correlation | - | - | - | - | - | - | - | 3 | 3 | 3 | - | - | - | - | - |