# B.E. Electronics and Communication Engineering

## CURRICULUM AND SYLLABI

## Ito IV Semesters

## Regulation - 2023

**EXCEL**

# ENGINEERING COLLEGE

## (Autonomous)

# EXCEL ENGINEERING COLLEGE
## (Autonomous)
**Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**
**Accredited by NBA and NAAC with "A+"and Recognized by UGC (2f&12B)**
**KOMARAPALAYAM - 637303**

**B.E. ELECTRONICS AND COMMUNICATION ENGINEERING**
**REGULATION − 2023**
**CHOICE BASED CREDIT SYSTEM**
**I and VIII SEMESTERS CURRICULUM AND SYLLABI**

| Code No. | Course | Category | Periods / Week | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | CA | FE | Total |
| **I SEMESTER** | | | | | | | | | |
| **Theory Course(s)** | | | | | | | | | |
| 23MA102 | Matrices and Calculus | BS | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC101 | Basics of Electrical Engineering | ES | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23LET07 | Heritage of Tamils (தமிழர் மரபு) | HSS | 1 | 0 | 0 | 1 | 100 | 0 | 100 |
| **Theory with Practical Course(s)** | | | | | | | | | |
| 23ENEXX | Language Elective I | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23CH101 | Chemistry for Electrical Sciences | BS | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| 23CS104 | Problem Solving using Python | ES | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| **Practical Course** | | | | | | | | | |
| 23EC102 | Electrical Engineering Practices Lab | ES | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| **Mandatory Course** | | | | | | | | | |
| 23MC001 | Mandatory Course I | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **TOTAL** | | | 17 | 1 | 8 | 20 | 490 | 310 | 800 |

| Language Electives – I | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Code No. | Course | Category | Periods / Week | | | C | Maximum Marks | | |
| | | | L | T | P | | CA | FE | Total |
| 23ENE01 | Communicative English | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23ENE02 | Advanced Communicative English | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |

Passed in Board of studies

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| | II SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|

| Code No. | Course | Category | Periods / Week | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | CA | FE | Total |
| **Theory Course(s)** | | | | | | | | | |
| 23MA202 | Mathematical foundations for Engineering | BS | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC201 | Electronic Devices | PC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23LET08 | Tamils and Technology/ தமிழரும் தொழில்நுட்பமும் | HSS | 1 | 0 | 0 | 1 | 100 | 0 | 100 |
| **Theory with Practical Course(s)** | | | | | | | | | |
| 23PH201 | Solid state Physics | BS | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| 23LEEXX | Language Elective II | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23ME101 | Engineering Graphics | ES | 1 | 0 | 4 | 3 | 50 | 50 | 100 |
| **Practical Course** | | | | | | | | | |
| 23EC202 | Electronic Devices &Circuits Lab | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| **Mandatory Course** | | | | | | | | | |
| 23MC002 | Mandatory Course II | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **Total** | | | **15** | **1** | **10** | **19** | **490** | **310** | **800** |

| Language Electives – II | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Code No. | Course | Category | Periods / Week | | | C | Maximum Marks | | |
| | | | L | T | P | | CA | FE | Total |
| 23LEE02 | Advanced Communicative English | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23ENE03 | Hindi | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23ENE04 | French | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23ENE05 | German | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| 23ENE06 | Japanese | HSS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |

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| | | | Periods / Week | | | | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| Code No. | Course | Category | L | T | P | C | CA | FE | Total |
| III SEMESTER | | | | | | | | | |
| **Theory Course(s)** | | | | | | | | | |
| 23EC301 | Signals & Systems | PC | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC302 | Analog Electronics | PC | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC303 | Digital Logic Design | PC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23CS302 | Object Oriented Programming and Data Structures | ES | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23UH001 | Universal Human Values | HSS | 2 | 1 | 0 | 3 | 100 | 0 | 100 |
| **Theory with Practical Course(s)** | | | | | | | | | |
| 23MA301 | Transforms and Boundary value problems | BS | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| **Practical Course(s)** | | | | | | | | | |
| 23EC304 | Analog and Digital Circuits Laboratory | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| 23CS303 | Object Oriented Programming Laboratory | ES | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| **Mandatory Course** | | | | | | | | | |
| 23MC003 | Mandatory Course III | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **Total** | | | 19 | 4 | 4 | 23 | 520 | 380 | 900 |

| | | | Periods / Week | | | | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| Code No. | Course | Category | L | T | P | C | CA | FE | Total |
| IV- SEMESTER | | | | | | | | | |
| **Theory Course(s)** | | | | | | | | | |
| 23MA401 | Numerical Methods | BS | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC401 | Linear Integrated Circuits | PC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EE408 | Control Systems Engineering | PC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC402 | Electromagnetic Fields | PC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Theory with Practical Course(s)** | | | | | | | | | |
| 23EC403 | Microprocessor and Microcontroller | PC | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| 23CS404 | Java Programming | ES | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| **Practical Course** | | | | | | | | | |
| 23EC404 | Linear Integrated Circuits Laboratory | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| **Mandatory Course** | | | | | | | | | |
| 23MC004 | Mandatory Course IV | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **Total** | | | 20 | 1 | 6 | 22 | 420 | 380 | 800 |

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| V- SEMESTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code No.** | **Course** | **Category** | **Periods / Week** | | | **C** | **Maximum Marks** | | |
| | | | **L** | **T** | **P** | | **CA** | **FE** | **Total** |
| **Theory Course(s)** | | | | | | | | | |
| 23EC501 | Digital Signal Processing | PC | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC502 | VLSI Design. | PC | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC0XX | Professional Elective-I | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECOXX | Open Elective-I | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Theory with Practical Course(s)** | | | | | | | | | |
| 23EC503 | Analog & Digital Communication | PC | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| 23CS504 | Artificial Intelligence and Machine Learning. | ES | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| **Practical Course** | | | | | | | | | |
| 23EC504 | Discrete Time Signal Processing Laboratory. | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| | | | | | | | | | |
| 23EC505 | VLSI Design Laboratory. | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |
| **Mandatory Course** | | | | | | | | | |
| 23MC005 | Mandatory Course V | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **Total** | | | **20** | **2** | **8** | **24** | **480** | **420** | **900** |

| VI- SEMESTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code No.** | **Course** | **Category** | **Periods / Week** | | | **C** | **Maximum Marks** | | |
| | | | **L** | **T** | **P** | | **CA** | **FE** | **Total** |
| **Theory Course(s)** | | | | | | | | | |
| 23EC601 | Microwave and Optical Communication. | PC | 3 | 1 | 0 | 4 | 40 | 60 | 100 |
| 23EC0XX | Professional Elective -II | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECOXX | Open Elective -II | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Theory with Practical Course** | | | | | | | | | |
| 23EC602 | Computer Communication Networks. | PC | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| 23EC603 | Embedded system and IoT Design | PC | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| | | | | | | | | | |
| **Practical Course** | | | | | | | | | |
| 23EC604 | Microwave and Optical Communication Laboratory | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |

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| 23EC605 | Design Thinking and Mini Project | EEC | 0 | 0 | 4 | 2 | 40 | 60 | 100 |
|---|---|---|---|---|---|---|---|---|---|
| **Employability Enhancement Course(s)** | | | | | | | | | |
| 23EEC608 | Internship | EEC | 2 | 0 | 0 | 1 | 100 | 0 | 100 |
| **Mandatory Course** | | | | | | | | | |
| 23MC006 | Mandatory Course VI | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **Total** | | | **19** | **1** | **10** | **22** | **520** | **380** | **900** |

| VII- SEMESTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code No.** | **Course** | **Category** | **Periods / Week** | | | **C** | **Maximum Marks** | | |
| | | | **L** | **T** | **P** | | **CA** | **FE** | **Total** |
| **Theory Course(s)** | | | | | | | | | |
| 23MG701 | Professional Ethics | HSS | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC701 | Wireless and Mobile Communication | PC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC0XX | Professional Elective -III | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC0XX | Professional Elective -IV | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECOXX | Open Elective -III | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Theory with Practical Course** | | | | | | | | | |
| 23EC702 | Image Processing and Computer Vision. | PC | 3 | 0 | 2 | 4 | 50 | 50 | 100 |
| **Practical Course** | | | | | | | | | |
| 23EC703 | Design Project. | EEC | 0 | 0 | 4 | 2 | 40 | 60 | 100 |
| **Total** | | | **18** | **0** | **6** | **21** | **290** | **410** | **700** |
| VIII- SEMESTER | | | | | | | | | |
| **Code No.** | **Course** | **Category** | **Periods / Week** | | | **C** | **Maximum Marks** | | |
| | | | **L** | **T** | **P** | | **CA** | **FE** | **Total** |
| **Theory Course(s)** | | | | | | | | | |
| 23EC0XX | Professional Elective -V | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC0XX | Professional Elective -VI | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Practical Course** | | | | | | | | | |
| 23EC801 | Major Project | EEC | 0 | 0 | 16 | 8 | 40 | 60 | 100 |
| **Total** | | | **6** | **0** | **16** | **14** | **120** | **180** | **300** |

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| Code No. | Course | Category | Periods / Week | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | CA | FE | Total |
| **PROFESSIONAL ELECTIVES (PE)** | | | | | | | | | |
| **STREAM – I NETWORKS & SIGNAL PROCESSING** | | | | | | | | | |
| 23PE001 | Vehicular Communication Network. | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE002 | High Speed Networks | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE003 | Fundamentals of MEMS | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE004 | Biomedical Signal processing | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE005 | Radar Engineering and Navigational Aids | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE006 | Antennas and MIMO Communication | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE007 | Principles of Speech Processing | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE008 | Deep learning | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE009 | Pattern Recognition | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE010 | Multimedia Compression Techniques | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **STREAM – II VLSI DESIGN** | | | | | | | | | |
| 23PE021 | ASIC Design | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE022 | Low Power VLSI | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE023 | VLSI Testing and Verification | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE024 | System-on-Chip | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE025 | Computer Aided Design for VLSI | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE026 | System Design using FPGA | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE027 | VLSI Signal processing | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE028 | Physical Design Automation | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE029 | HDL based FPGA Design | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE030 | Device Modeling | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **STREAM – III EMBEDDED & IoT** | | | | | | | | | |
| 23PE041 | Embedded Sensing Technologies | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE042 | IoT for Industrial Applications | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE043 | Robotics and Automation | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE044 | RISC Architecture | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE045 | ARM Based Embedded System | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

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| Code | Course | Cat | L | T | P | C | CA | FE | Total |
|---|---|---|---|---|---|---|---|---|---|
| 23PE046 | Industry 5.0 | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23PE047 | Real Time Operating System | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC048 | IoT applications and Biomedical sensors | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC049 | Wireless Sensor Networks and IoT | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23EC050 | Design of Embedded Systems | PE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**OPEN ELECTIVE COURSES (For Other Branches)**

| Code No. | Course | Category | L | T | P | C | CA | FE | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Theory Course(s)** | | | | | | | | | |
| 23ECO01 | Industrial Electronics | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO02 | Image Processing and Computer Vision | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO03 | 4G/5G Communication Networks | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO04 | Wireless Communication | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO05 | Embedded and Real Time Systems | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO06 | Robotics and its Industrial Application | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO07 | Industrial IoT | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 23ECO08 | Sensors and Transducers | OE | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**ONE CREDIT COURSES**

| Code No. | Course | Category | L | T | P | C | CA | FE | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Theory Course(s)** | | | | | | | | | |
| 23ECA01 | PCB Design Using Advanced Tools | EEC | 0 | 0 | 2 | 1 | 0 | 100 | 100 |
| 23ECA 02 | Hands on course on modeling of digital system using HDL | EEC | 0 | 0 | 2 | 1 | 0 | 100 | 100 |
| 23ECA03 | Computer Vision for Embedded Systems | EEC | 0 | 0 | 2 | 1 | 0 | 100 | 100 |
| 23ECA04 | Data Analytics with Power BI | EEC | 0 | 0 | 2 | 1 | 0 | 100 | 100 |
| 23ECA05 | LoRA for IoT | EEC | 0 | 0 | 2 | 1 | 0 | 100 | 100 |

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| Code No. | Course | Category | L | T | P | C | | CA | FE | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 23ECA06 | RF system Design | EEC | 0 | 0 | 2 | 1 | 0 | 100 | | 100 |
| 23ECA07 | Hands Training on Antenna Design | EEC | 0 | 0 | 2 | 1 | 0 | 100 | | 100 |
| 23ECA08 | Wearable Medical Devices. | EEC | 0 | 0 | 2 | 1 | 0 | 100 | | 100 |
| 23ECA09 | Hands on training biomedical image processing | EEC | 0 | 0 | 2 | 1 | 0 | 100 | | 100 |

| Mandatory Course | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Code No. | Course | Category | Periods / Week | | | C | Maximum Marks | | | |
| | | | L | T | P | | CA | FE | Total | |
| **Theory Course(s)** | | | | | | | | | | |
| 23MC001 | Induction programme | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 | |
| 23MC002 | Environmental Science | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 | |
| 23MC003 | Interpersonal Skills | MC | 0 | 0 | 2 | 0 | 100 | 0 | 100 | |
| 23MC004 | Indian Constitution | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 | |
| 23MC005 | Yoga and values holistic development | MC | 0 | 0 | 2 | 0 | 100 | 0 | 100 | |
| 23MC006 | Soft skills. | MC | 0 | 0 | 2 | 0 | 100 | 0 | 100 | |

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**SUMMARY**

| S.No | CATEGORY | CREDITS PER SEMESTER | | | | | | | | TOTAL CREDIT (AICTE) | CREDITS in % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | | |
| 1 | HSS | 4 | 4 | 3 | | | | 3 | | 14 (10-14) | 8.48% |
| 2 | BS | 8 | 8 | 4 | 4 | | | | | 24 (22-28) | 14.54% |
| 3 | ES | 8 | 3 | 4 | 4 | 4 | 4 | | | 27 (27) | 16.36% |
| 4 | PC | | 4 | 12 | 14 | 13 | 13 | 7 | | 63 (61) | 38.18% |
| 5 | PE | | | | | 3 | 3 | 6 | 6 | 18 (18) | 10.90% |
| 6 | OE | | | | | 3 | 3 | 3 | | 9 (9) | 5.45% |
| 7 | EEC | | | | | | 3 | 2 | 8 | 12 (12-16) | 7.27% |
| 8 | MC | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0% |
| | Total | 20 | 19 | 23 | 22 | 24 | 22 | 21 | 14 | 165 | 100.00 % |

HSS - Humanities and Social Sciences

BS - Basic Sciences

ES - Engineering Sciences

PC - Professional Core

PE - Professional Electives

OE - Open Electives

EEC - Employability Enhancement Courses

MC - Mandatory Courses (Non-Credit Courses)

CA - Continuous Assessment

FE - Final Examination

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| 23MA102 | MATRICES AND CALCULUS (Common to all B.E/B.Tech Programmes) | L | T | P | C |
|---------|------------------------------------------------------------|---|---|---|---|
|         |                                                            | 3 | 1 | 0 | 4 |
| **Nature of Course** | Basic Sciences |
| **Pre requisites** | Nil |

## Course Objectives

### The course is intended to

1. Introduce the concept of orthogonal transformation to convert the square matrix into diagonal form.
2. Acquaint the student with mathematical tools needed in evaluating derivatives and differentiation of one variable.
3. Familiarize the functions of two variables, Taylor series and Jacobian techniques
4. Impart knowledge of double integral techniques in evaluating volume of the solid.
5. Learn the Green's theorem Stoke's theorem and the Divergence theorem to compute integrals

## Course Outcomes

On successful completion of the course the students will be able to

| CO. No | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO 1 | Apply the concept of orthogonal reduction for diagonalization of the given matrix | Apply |
| CO 2 | Execute the rules of differentiation to differentiate the functions. | Apply |
| CO 3 | Demonstrate the maxima and minima for a given function with two variables | Apply |
| CO 4 | Apply integration to compute area and volume using multiple integrals | Apply |
| CO 5 | Interpret the Green's theorem, Stokes' theorem and Divergence theorem to evaluate integrals. | Apply |

## Course Contents

### Module – I      MATRICES                                                          9+3

Eigen values and Eigenvectors of a real matrix – Characteristic Equation- Properties - Cayley Hamilton Theorem - Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of Quadratic Forms.

### Module – II     DIFFERENTIAL CALCULUS                                             9+3

Functions of single Variable -Limits and Continuity - Derivatives - Differentiation rules(sum, product, quotient, chain rule) – Implicit differentiation-Logarithmic differentiation-Maxima and Minima of function of one variable –Taylors series.

### Module – III     FUNCTIONS OF TWO VARIABLES                                       9+3

Limits and Continuity –Partial differentiation-Homogeneous functions and Euler's theorem– Jacobians –Partial differentiation of implicit functions–Taylor's series– Maxima and minima – Lagrange's method of multipliers.

Module – IV     **MULTIPLE INTEGRALS**             9+3

Double integrals – Change of order of Integrations- Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids.

9+3

Module – V     **VECTOR CALCULUS**

Gradient and directional derivative — Divergence and curl — Green's, Gauss divergence and Stoke's theorems — Verification and application in evaluating line, surface and volume integrals (cube, rectangular parallelepiped)

Total : 60 Periods

### Text Books

1. B.K.Pal and K.Das , "Engineering Mathematics", Volume-1, 10$^s$ Edition, U.N.Dhur and Sons private limited,2020
2. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 44$^t$ Edition. 2019

### Reference Books

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company. 1$^{st}$ Edition, 2018
2. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics Semester II", Laxmi Publications, 6$^{th}$ Edition 2015.
3. Veerarajan T," Engineering Mathematics for Semester I and II", Tata McGraw Hill. 3$^{rd}$ Edition 2017.

### Additional References

1. NPTEL-https://nptel.ac.in/courses/111105035
2. NPTEL-https://nptel.ac.in/courses/111104144
3. NPTEL-https://nptel.ac.in/courses/111105122

### Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

| COs | POs | | | | | | | | | | | | PSOs | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO 1 | 3 | 2 | 2 | | | | | | | | | | 1 | |
| CO 2 | 3 | 3 | 2 | | | | | | | | | | 1 | |
| CO 3 | 3 | 1 | 1 | | | | | | | | | | 1 | |
| CO 4 | 3 | 2 | 1 | | | | | | | | | | 1 | |
| CO 5 | 3 | 2 | 2 | | | | | | | | | | 1 | |
| | 3-High | | | 2-Medium | | | 1-Low | | | | | | | |

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## Formative Assessment

| Blooms Taxonomy | Assessment Component | Marks | Total marks |
|---|---|---|---|
| Remember | Quiz | 5 | |
| Understand | Tutorial class / Assignment | 5 | 15 |
| Apply | | | |
| | Attendance | 5 | |

## Summative Assessment

| Bloom's Category | Internal Assessment Examinations (IAE) | | | Final Examinations (FE) 60 |
|---|---|---|---|---|
| | IAE – I (5) | IAE – II (10) | IAE – III (10) | |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 30 | 30 | 30 | 60 |
| Apply | 10 | 10 | 10 | 20 |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |

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| 23EC101 | BASICS OF ELETRICAL ENGINEERING | L | T | P | C |
|---------|-------------------------------|---|---|---|---|
|         |                               | 3 | 0 | 0 | 3 |

| **Nature of Course** | Basic Sciences |
|----------------------|----------------|
| **Pre requisites** | Fundamental maths and physics |

**Course Objectives**

**The course is intended to**

1. Study the laws and theorems applied to solve electrical circuits and networks.
2. Know the basic concepts in AC circuits.
3. Learn the various characteristics of transformer.
4. Enhance the principles of DC machines.
5. Acquire the knowledge of AC machines.

**Course Outcomes**

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|-------|----------------|---------------|
| CO 1 | Explain basic laws to calculate the voltage, current and power for dc electric circuit. | Understand |
| CO 2 | Describe the basic concepts of the AC power circuits. | Understand |
| CO 3 | Articulate the performance of transformers with the constraints. | Apply |
| CO 4 | Interpret the construction and working of different types of dc machines. | Apply |
| CO 5 | Illustratethe construction and working principles of AC machines. | Apply |

**Course Contents**

| MODULE – I | DC CIRCUITS | 9 |
|------------|-------------|---|
| Introduction- Current and Voltage sources, Resistance, Inductance and Capacitance, Ohm's law and Kirchhoff's law & it's application, Mesh and Nodal analysis, voltageand current division, Super position theorem, Maximum power transfer theorem. | | |

| MODULE – II | AC CIRCUITS | 9 |
|-------------|-------------|---|
| Generation of sinusoidal voltage, AC values, Single Phase RL, RC, RLC Series circuits, Power in AC circuits, Power Factor, Three Phase Systems, Three Phase Power Measurement, Simple layout of generation, transmission & distribution of power. | | |

| MODULE – III | TRANSFORMER | 9 |
|--------------|-------------|---|
| Construction, transformer rating, EMF equationoftransformer, ideal transformer, losses, Equivalent circuit of a transformer,regulation, efficiency, open circuit and short circuit test of transformer, Auto transformer. | | |

| MODULE – IV | DC MACHINES | 9 |
|-------------|-------------|---|
| Construction and principle of operation of DC motor and generator, types of DC motors, EMF and torque equation, Methods of excitation and magnetization characteristics, Starting methods and speed control. Universal Motor. | | |

| MODULE – V | AC MACHINES | 9 |
|---|---|---|
| Three phase induction motor-construction and principle of operation, equivalent circuit, slip and torque, speed characteristics. Single phase induction motor-construction and principle of operation, types-capacitor start induction motor and capacitor start induction motor, run induction motor and stepper motor. | | |

**Total : 45 Periods**

| Text Books |
|---|
| 1.D.P Kothari and LJ Nagrath, "Basic Electrical! Engineering", McGraw Hill Education (India) Private Limited, Fourth Edition, 2020.<br>2. B.L.Theraja "Fundamentals of Electrical Engineering & Electronics", S. Chand &Co.Ltd.2015.<br>3. Rohit Mehta and V.K. Mehta, "Principles of Electrical Engineering and Electronics, S.Chand&Co.Ltd, Second Edition. 2015. |
| **Reference Books** |
| 1. Rajput R.K., "Basic Electrical and Electronics Engineering", Laxmi publications, Second Edition, 2012.<br>2. Charles K Alexander, Mathew N O Sadiku, "Fundamentals of Electric Circuits", Tata McGraw Hill, Seventh edition, 2020.<br>3. Rajendra Prasad "Fundamentals of Electrical engineering", Prentice Hall of India, Third Edition, 2014. |

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **POs** | | | | | | | | | | | | **PSOs** | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| **CO 1** | 2 | 1 | | | | | | | | | | 2 | 3 | 2 | 3 |
| **CO 2** | 2 | 1 | | | | | | | | | | 2 | 3 | 2 | 3 |
| **CO 3** | 3 | 1 | | | | | | | | | | 3 | 3 | 2 | 3 |
| **CO 4** | 3 | 1 | | | | | | | | | | 2 | 3 | 2 | 3 |
| **CO 5** | 3 | 1 | | | | | | | | | | 2 | 3 | 2 | 3 |
| | **3-High** | | | **2-Medium** | | | **1-Low** | | | | | | | | |

| Formative Assessment | | | |
|---|---|---|---|
| **Blooms Taxonomy** | **Assessment Component** | **Marks** | **Total marks** |
| Remember | Quiz | 5 | |
| Understand<br>Apply | Tutorial class / Assignment | 5 | 15 |
| | Attendance | 5 | |

| Bloom's Category | Summative Assessment | | | |
|---|---|---|---|---|
| | Internal Assessment Examinations (IAE) | | | Final Examinations (FE) |
| | IAE – I (7.5) | IAE – II (7.5) | IAE – III (10) | 60 |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 30 | 30 | 30 | 60 |
| Apply | 10 | 10 | 10 | 20 |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |

23LET07 தமிழர் மரபு

LTPC
1 0 0 1

3

அலகு I மொழி மற்றும் இலக்கியம்:
இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி –
தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க
இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் –
தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி
இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில்
நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும்
பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை –
சிற்பக் கலை:
3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர்
மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர்
செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் –
குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை,
வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில்
கோயில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:
3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம்,
தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்
விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்:
3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க
இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய
அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் –
சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும்
இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத்
தமிழர்களின் பங்களிப்பு:
3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில்
தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில்,
சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப்
புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

TEXT BOOKS
1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு:
   தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை
   வெளியீடு)

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**REFERENCE BOOKS**

1. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
2. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (In print)
3. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
4. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
5. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

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**23LET07**  **HERITAGE OF TAMILS**  L T P C
1 0 0 1

**UNIT I     LANGUAGE AND LITERATURE**  3

Language Families in India - Dravidian Languages – Tamil as aClassical 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

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

1.  தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.  கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.  கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

**REFERENCE BOOKS**

1.  பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
2.  Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
3.  Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
4.  Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
5.  The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

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| 23ENE01 | COMMUNICATIVE ENGLISH | L | T | P | C |
|---|---|---|---|---|---|
| | Common to all B.E./B.Tech Programmes | 2 | 0 | 2 | 3 |
| **Nature of Course** | Humanities and Sciences | | | | |
| **Pre requisites** | Nil | | | | |

## Course Objectives

The course is intended to
1. Improve lexical, grammatical and semantic competence.
2. Enhance communicative skills in real life situations.
3. Augment thinking in all forms of communication.
4. Equip with oral and written communication skills.
5. Gain employability skills.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1. | Use effectively the lexical, grammatical and semantic knowledge | Understand |
| CO2. | Communicate with clarity using intentional vocabulary in English | Apply |
| CO3. | Articulate perfectly and express their opinions confidently | Apply |
| CO4. | Accomplish listening and reading skills for life long learning | Apply |
| CO5. | Comprehend, interpret and present data | Understand |

## Course Contents:

### MODULE I   BASIC GRAMMAR AND USAGE   9

**Grammar:** Parts of Speech -- Verb (Primary & Modal Auxiliary) -- Prefixes and Suffixes **Listening:** Listening Skills: Importance and Types of Listening -- Barriers of Listening - Listening to short monologues **Speaking:** Introducing oneself -- Role play **Reading:** Types of Reading -- Intensive reading -- Extensive Reading -- Reading Comprehension **Writing:** Permission letter (Industrial Visit) -- Informal letter -- Dialogue writing

### MODULE II   APPLICATIONS OF LANGUAGE SKILLS   9.

**Grammar:** Tenses (Present, Past and Future) -- Different Forms of a word -- Types of Questions **Listening:** Listening strategies -- Listening to Announcements **Speaking:** Likes and dislikes- Movie Reviews **- Reading:** Skimming - Scanning - Reading Newspaper and Articles **Writing:** Inviting Dignitaries -- Accepting Invitation -- Declining Invitation.

### MODULE III   CONVERSATIONAL SKILLS   9

**Grammar:** If conditionals -- Numerical Adjectives **Listening:** - Listening to Telephone calls and taking notes -- Listening Lectures **Speaking:** Technical Presentation -- Group Discussion **Reading:** Reading Magazines · Cloze Test **Writing:** Calling for Quotation -- Complaint Letter -- Process Description

### MODULE IV   GRAMMATICAL ACCURACY COMPETENCE   9

**Grammar:** Subject verb agreement -- Discourse markers - One word substitution **Listening:** Listening and gap filling -- Listening and Match the answers **Speaking:** Narrating Story - Asking and giving directions **Reading:** Rearranging Jumbled sentence - Note making **Writing:** Instructions -- Hints Developing - Report Writing (Fire and Accident Report)

# MODULE V    TECHNICAL WRITING SKILLS

**Grammar:** Homophones and Homonyms - Abbreviation and Acronyms **Listening:** Listening announcements – Listening and Summing up **Speaking:** Impromptu speech – Presentation at a business meeting **Reading:** Reading and summarizing articles **Writing:** Paragraph Writing – Checklist – Story writing.

**Total: 45 Periods**

## Laboratory Components

| S.No. | List of Exercises | CO Mapping | RBT |
|-------|-------------------|------------|------------|
| 1 | Self Introduction | 1 | Understand |
| 2 | Movie Review | 2 | Apply |
| 3 | Group Discussion | 3 | Apply |
| 4 | Asking and Giving Directions | 4 | Apply |
| 5 | Impromptu Speech | 5 | Apply |
| 6 | Listening to short monologues | 1 | Understand |
| 7 | Listening to Announcement | 2 | Understand |
| 8 | Listening Telephone calls | 3 | Understand |
| 9 | Listening and Gap Filling | 4 | Apply |
| 10 | Listening and Match the answers | 4 | Apply |

## Text Books

1. Rizvi, Ashraf.M, "Effective Technical Communication",Tata McGraw Hill Publishing company Limited,New Delhi, 2nd Edition, 2018.
2. Hewings. M, "Advanced English Grammar", 3rd Edition, Cambridge University Press, Chennai, 9th Edition, 2019.
3. Board of Editors, "Using English – A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Private Limited, Hyderabad, 3rd Edition, 2019.

## Reference Books:

1. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press,USA,13thEdition,2018.
2. Norman Whitby, Business Benchmark – "Pre-Intermediate to Intermediate, Students Book", Cambridge University Press, 1st Edition, 2006.
3. Dhanavel S. P., "English and Soft Skills", 1stEdition, Orient Black Swan Private Limited, Hyderabad, 1st Edition, 2010.

## Web References:

1. https://www.englishclub.com/grammar/
2. https://learnenglish.britishcouncil.org
3. https://www.indiabix.com/verbal-ability/questions-and-answers/
4. https://www.ellio.org
5. https://englishforeveryone.org/Topics/Reading-Comprehension.html

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Passed in Board of Studies Meeting on 17.03.23          Passed in Academic Council Meeting on 27.04.23

## Mapping of Course Outcomes (CO) with Programming Outcomes (PO) Programme Specific Outcomes (PSO)

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | | | | | | | | | | 3 | 1 | 2 | 2 | | |
| CO2 | | | | | | | | | | 3 | 1 | 2 | 2 | | |
| CO3 | | | | | | | | | | 3 | 1 | 2 | 2 | | |
| CO4 | | | | | | | | | | 3 | 1 | 2 | 2 | | |
| CO5 | | | | | | | | | | 3 | 1 | 2 | 2 | | |
| | 3 | High | | | 2 | Medium | | | | 1 | Low | | | | |

| | Summative assessment | | | | | |
|---|---|---|---|---|---|---|
| | Continuous Assessment | | | | | Final Examination (Theory) [50 marks] |
| Bloom's Level | Theory Marks | | | | Practical | |
| | IAE-I [5] | IAE-II [10] | IAE -III [10] | Attendance [5] | Rubric based CIA [20 Marks] | |
| Remember | - | - | - | | - | - |
| Understand | 40 | 40 | 40 | | 40 | 40 |
| Apply | 60 | 60 | 60 | | 60 | 60 |
| Analyse | - | - | - | | - | - |
| Evaluate | - | - | - | | - | - |
| Create | - | - | - | | - | - |

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| 23CH101 | CHEMISTRY FOR ELECTRICAL SCIENCES (Common to BME, ECE and EEE courses) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Nature of Course | Basic Sciences |
|---|---|
| Pre requisites | Nil |

## Course Objectives

The course is intended to

1. Impart knowledge and understanding about the constituents present in water and the need for purification of water.
2. Provide knowledge about the basic principles preparatory methods and applications of nanomaterials
3. Understand the fundamentals and classifications of batteries.
4. Develop the understanding and applications of basic concepts of electrochemistry.
5. Understand the causes and control measures of corrosion

## Course Outcomes

On successful completion of the course the students will be able to

| CO. No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Develop innovative and eco-friendly method for water purification to meet the growing industrial demand. | Apply |
| CO 2 | Discuss the basic principles, synthesis and applications of nanomaterials. | Understand |
| CO 3 | Discuss the basic principles and mechanism of working of batteries and fuel cells. | Understand |
| CO 4 | Illustrate the principles of electro chemical cells, EMF, electroplating and electrolysis. | Understand |
| CO 5 | Demonstrate the importance of protection of metals from corrosion. | Apply |

## Course Contents

### Module – I      WATER ANALYSIS AND WATER TREATMENT      9

Water analysis: Sources of water, hard water and soft water, Hardness of water, acidity, alkalinity and pHvalue, Biological Oxygen Demand (BOD), Chemical Oxygen Demand(COD). Water treatment: Definition, Zeolite process, Conditioning methods: internal conditioning (Phosphate, Calgon) and external conditioning (Demineralization), Desalination. Reverse osmosis (RO).

### Module – II      NANOCHEMISTRY      9

Basics: Distinction between molecules, nanomaterials and bulk materials, Size-dependent properties, Types of nanomaterials: Definition, properties, and uses of nanoparticle, nanocluster, nanorod, nanowire and nanotube. Synthesis, Sol-Gel and laser ablation methods. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

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## Module – III   ELECTROCHEMISTRY   9

Electrode potential, Nernst equation and problems, Reference electrodes, Standard hydrogen electrode, Calomel electrode, Ion selective electrode, Measurement of pH by glass electrode, Electro chemical series, Electro chemical cell, Galvanic cell: measurement of EMF.

## Module – IV   ENERGY STORAGE DEVICES   9

Batteries: Definition, characteristics and classification. Primary battery: Alkaline battery, Secondary battery: lead acid battery, lithium-ion and lithium phosphate battery, Fuel cells: construction and working of $H_2$-$O_2$ fuel cell.

## Module – V   CORROSION AND ITS CONTROL   9

Corrosion: Classification, Types: Chemical corrosion and Electrochemical corrosion. Corrosion control: Corrosion Inhibitors, cathodic protection (sacrificial anodic protection, Impressed current cathodic protection), Protective coating, Paint and Electroplating.

**Total : 45 Periods**

### Laboratory Component

| S.No. | Name of the Experiment | CO Mapping | RBT |
|-------|------------------------|------------|-----|
| 1 | Determination of hardness of water. | 3 | Apply |
| 2 | Determination of chloride content in water sample. | 3 | Apply |
| 3 | Conductometric titration of strong acid versus strong base. | 3 | Apply |
| 4 | Determination of strength of HCl by pH metry. | 3 | Apply |
| 5 | Estimation of copper in brass by EDTA method. | 3 | Apply |
| 6 | Determination of rate of corrosion by weight loss method | 3 | Apply |
| 7 | Estimation of strength of iron by potentiometric titration | 3 | Apply |
| 8 | Determination of strength of acids in a mixture of acids using conductivity meter | 3 | Apply |

**Total Periods: 30**

### Text Books

1. Dr. A. Ravikrishnan. "Engineering Chemistry" Sri Krishna Hitech Publishing Company, Chemistry, 2021.
2. A Textbook of Engineering Chemistry by Ushamani M George KE, Rani Joseph, 2021.
3. Dr.Sunita Rattan. Publisher, S K. Kataria & Sons. Reprint 2020.

### Reference Books

1. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
2. 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.
3. Monica Jain P. C. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company, 17th Edition, 2019

### Additional References

1. https://nptel.ac.in/downloads/122101001
2. https://nptel.ac.in/courses/103103033/module9/lecture1.pdf
3. https://nptel.ac.in/courses/102103044/3
4. https://www.youtube.com/watch?v=jFQeDel6bug

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## Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

| COs | POs | | | | | | | | | | | | PSOs | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO 1 | 3 | 2 | | | 3 | | | | | | 1 | | | |
| CO 2 | 3 | 2 | | | 3 | | | | | | 1 | | | |
| CO 3 | 3 | 2 | | | 3 | | | | | | 1 | | | |
| CO 4 | 3 | 2 | | | 3 | | | | | | 1 | | | |
| CO 5 | 3 | 1 | | | 3 | | | | | | 1 | | | |
| | 3-High | | | | 2-Medium | | | | 1-Low | | | | | |

## Summative Assessment

| Bloom's Level | Continuous Assessment | | | | | Final Examination (Theory) [50] |
|---|---|---|---|---|---|---|
| | Theory | | | | Practicals | |
| | IAE-I [5] | IAE-II [10] | IAE-III [10] | Attendance [5] | Rubric based CIA [20] | |
| Remember | 20 | 20 | 20 | | - | 30 |
| Understand | 25 | 25 | 25 | | 40 | 60 |
| Apply | 5 | 5 | 5 | | 60 | 10 |
| Analyze | - | - | - | | - | |
| Evaluate | - | - | - | | - | |
| Create | - | - | - | | - | |

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| | | L | T | P | C |
|---|---|---|---|---|---|
| 23CS104 | PROBLEM SOLVING USING PYTHON<br>( Common to BME, ECE, EEE) | 3 | 0 | 2 | 4 |

| Nature of Course | Engineering Sciences |
|---|---|
| Prerequisites | Mathematical and Logical Knowledge |

## Course Objectives

### The course is intended

1. Learn the basics of algorithmic problem solving.
2. Think logically and write algorithms and draw flow charts for problems.
3. Make use of python functions and call them.
4. Utilize the Python data structures — lists, tuples, dictionaries and files.

## Course Outcomes

On successful completion of the course the students will be able to

| CO. No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Recall algorithmic solutions to simple computational problems and read, write, execute by simple python programs | Remember |
| CO 2 | Classify and Read, Write, Execute by hand simple python programs. | Understand |
| CO 3 | Structure simple python programs for solving problems. | Understand |
| CO 4 | Examine simple Python programs using conditionals and loops for solving problems | Apply |
| CO 5 | Show the python string functions and lists | Apply |
| CO 6 | Practice the compound data using python Tuples, Dictionaries, Files and Packages | Apply |

## Course Contents

**MODULE – I    Basics of Computers & Problem solving**            9

Computer Basics–Components-Computer organization-Computer Software-Types of software - Software Development steps -Need for logical analysis and thinking- Algorithms –Flowchart.

**MODULE – II    Introduction of Python Programming**            9

Introduction- Python IDLE Installation- Python Interpreter- Interactive and script mode-Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, Input and Output Statements.

**MODULE – III    Control statements and Functions**            9

Conditional (if), alternative (if-else), chained conditional (if-elif-else)- Iteration- while,for,break,continue, pass – Functions - Introduction, inbuilt functions, user defined functions, recursion.

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MODULE – IV    Strings, Lists                                               9

Strings- String slices, immutability, string methods and operations- Lists- creating lists, list operations, list methods, mutability, aliasing, cloning lists, list and strings, list and functions.

MODULE – V    Tuples, Dictionaries, Files and Packages                      9

Tuples- Tuple assignment, lists and tuples, Tuple as return value- Dictionaries- operations and methods, Files and Exception-Text files, reading and writing files.

Total : 45 Periods

### Laboratory Components

| S.No | List of Exercises | CO Mapping | RBT |
|------|-------------------|------------|-----|
| 1 | Write a algorithm & draw flowchart for simple Computational problems. | CO1 | Apply |
| 2 | Write a program to perform different arithmetic operations on numbers in python. | CO1 | Apply |
| 3 | Write a python program to implement the various control structures. | CO2 | Apply |
| 4 | Write a python program for computational problems using recursive function. | CO2 | Apply |
| 5 | Demonstrate use of list for data validation. | CO3 | Apply |
| 6 | Develop a python program to explore string functions. | CO3 | Apply |
| 7 | Write a python program to find a given number is ODD or EVEN | CO4 | Apply |
| 8 | Write a python class to reverse a string word by word | CO4 | Apply |
| 9 | Develop python programs to perform operations on dictionaries. | CO5 | Apply |
| 10 | Write a python program to read and write into a file. | CO5 | Apply |

### Text Books

1. Reema Thareja, "Problem Solving and Programming with Python", Oxford University Press, 1st Edition 2021.
2. Dr. R. Nageswara Rao, "Core Python Programming", Dream tech Press, 1st Edition 2019.

### Reference Books

1. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2nd Edition 2021.
2. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 1st Edition 2020.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2nd Edition 2019.
4. Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 1st Edition 2015.

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**Additional References**

1. **Python Research Association of India** - https://www.araiindia.com/services/technology-and-products
2. **NPTEL** - https://nptel.ac.in/courses/107/106/107106088/
3. **MOOC Courses** - https://www.mooc-list.com/tags/automotive-engineering

**Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)**

| COs | POs | | | | | | | | | | | | PSOs | | |
|------|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO 1 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 6 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| | 3 | \multicolumn{4}{}{High} | | | | 2 | \multicolumn{4}{}{Medium} | | | | 1 | \multicolumn{3}{}{Low} | | |

| Bloom's Level | Summative Assessment | | | | | | Final Examination (Theory) [50] |
|---|---|---|---|---|---|---|---|
| | Continuous Assessment | | | | | | |
| | Theory | | | | Practicals | | |
| | IAE-I[5] | IAE-II[10] | IAE-III[10] | Attendance[5] | Rubric Based CIA [10] | Model Examination [10] | |
| Remember | 10 | 10 | 10 | | 20 | | 20 |
| Understand | 20 | 20 | 20 | | 20 | | 40 |
| Apply | 20 | 20 | 20 | | 10 | | 40 |
| Analyze | | | | | | | |
| Evaluate | | | | | | | |
| Create | | | | | | | |

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| 23EC021 | ELECTRICAL ENGINEERING PRACTICES LAB | L | T | P | C |
|---------|--------------------------------------|---|---|---|---|
|         |                                      | 3 | 0 | 0 | 3 |

| Nature of Course | ELECTRICAL ENGINEERING PRACTICES LAB |
|------------------|--------------------------------------|
| Pre requisites   | NIL                                  |

## Course Objectives

The course is intended to

1. Provide hands on experience on various house hold Appliances.
2. Learn the function of electrical parameters and calibration of voltage and current.
3. Gain the knowledge basic electronic components and equipments.
4. Study the basic circuits using Active and Passive Components.
5. Enhance the fundamental principles of logic gates.

## Course Outcomes

On successful completion of the course the students will be able to

1. Construct the basic house hold electrical wirings.
2. Illustrate the electrical quantities using meters.
3. Manipulate sine, square and triangular waveforms with required frequency and amplitudeusing Function generator.
4. Experiment the RLC Components and Logic gate.
5. Develop the simple electronic circuits using PCB Design.

## CYCLE-1

| S.NO | COURSE CONTENT | CO | BLOOM'S LEVEL |
|------|----------------|----|---------------|
| 1 | Residential house wiring using switches, fuse, indicator, lamp and energy meter | CO1 | Apply |
| 2 | Fluorescent lamp wiring | CO1 | Apply |
| 3. | Staircase wiring | CO1 | Apply |
| 4. | Measurement of electrical quantities-voltage, current, power and power factor in RLC circuit. | CO2 | Apply |
| 5. | Measurement of energy using single phase energy meter | CO2 | Apply |

## CYCLE-2

| S.NO | COURSE CONTENT | CO | BLOOM LEVEL |
|------|----------------|----|-------------|
| 1 | Study of electronic components and equipment-resistor-colour coding. Measurement of AC signal parameter (Peak-Peak voltage, RMS voltage, frequency) using CRO. | CO3 | Apply |
| 2 | Study of logic gates AND, OR, EXOR and NOT. | CO3 | Apply |
| 3. | Generation of clock signal. | CO4 | Apply |
| 4. | Soldering practice-components devices and circuits-using general purpose PCB. | CO5 | Apply |
| 5. | Measurement of ripple factor of HWR and FWR | CO5 | Apply |

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

**Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)**

3-High    2-Medium    1-Low

| Summative Assessment | | |
|---|---|---|
| **Bloom's Level** | **Rubric based continuous assessment [50 marks]** | **Final examination [50 marks]** |
| Remember | 10 | 10 |
| Understand | 30 | 50 |
| Apply | 50 | 30 |
| Analyze | 10 | 10 |
| Evaluate | | |
| Create | | |

Passed in Board of Studies Meeting                    Passed in Academic Council Meeting

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| 23MC101 | INDUCTION PROGRAMME | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |
| **Nature of Course** | Mandatory, Non Credit | | | | |
| **Pre requisites** | Completion of Schooling at Higher Secondary Level | | | | |

## Course Objectives

The course is intended to

1. To nurture the character and behavior as a student.
2. To have broad understanding of society andrelationships.
3. To impart interpersonal and softskills.
4. To inspire the students in the field ofengineering.
5. To provide exposure toindustries.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Perform curricular and co-curricular activities excellently. | Knowledge |
| CO 2 | Do the skill based training with excellence. | Understand |
| CO 3 | Work as team for the given task | Apply |
| CO 4 | Gain character and behaviour | Knowledge |
| CO 5 | Demonstrate the acquired skills effectively | Apply |

## Course Contents
**PHYSICAL ACTIVITY**

Yoga, Sports

**CREATIVE ARTS (students can select any one of their choice)**

Painting, sculpture, pottery, music, craft making and so on

**UNIVERSAL HUMAN VALUES**

Enhancing soft skills

**LITERARY AND PROFICIENCY MODULES**

Reading, Writing, Speaking- Debate, Role play etc., Communication and computer skills

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**LECTURES BY EMINENT PEOPLE**

Guest lecture by subject experts

**VISIT TO LOCAL CITIES**

Meditation centers / Industry

**FAMILARIZATION TO DEPARTMENT / BRANCH INNOVATION**

Lectures by Departments Head and senior faculty members

**Total Hours: 45**

**Mapping of COs with POs and PSOs**

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **POs** | | | | | | | | | | | | **PSOs** | | |
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| CO1 | | | | | | 2 | 1 | 2 | | | | 3 | 2 | | |
| CO2 | | | | | | 2 | 1 | 2 | | | | 3 | 2 | | |
| CO3 | | | | | | 2 | 1 | 2 | | | | 3 | 2 | | |
| CO4 | | | | | | 2 | 1 | 2 | | | | 3 | 2 | | |
| CO5 | | | | | | 2 | 1 | 2 | | | | 3 | 2 | | |
| | 3 | High | | | | 2 | Medium | | | | | 1 | Low | | |

| Bloom's Level | Continuous Assessment (Non-Credit, Mandatory) | | | | |
|---|---|---|---|---|---|
| | **Test -I [20 ]** | **Test -II [20]** | **Test - III [20]** | **Assignment/ Activity [20]** | **Attendance [20]** |
| Remember | 10 | 10 | 10 | | |
| Understand | 20 | 20 | 20 | 10 | |
| Apply | 20 | 20 | 20 | 10 | |
| Analyse | | | | | |
| Evaluate | | | | | |
| Create | | | | | |

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| 23MA202 | MATHEMATICAL FOUNDATIONS FOR ENGINEERING | L | T | P | C |
|---------|----------------------------------------------------------------|---|---|---|---|
|         | (Common to all B.E. / B.Tech Programme)                        | 3 | 1 | 0 | 4 |

| Nature of Course | Basic Sciences |
|------------------|-----------------------------------|
| Pre requisites   | Fundamentals of Basic Mathematics |

## Course Objectives

The course is intended to

1. Understand the curvature and calculate the radius of curvature, centre, evolutes, involutes.
2. Acquire the mathematical skills required to solve ordinary differential equations.
3. Familiarizethe concepts of Laplace transform and its inverse.
4. Gain knowledge of analytic approach to analyse the conformal mapping.
5. Obtainthe knowledge of evaluating contour integrals using residue theorem.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---------|----------------|---------------|
| CO1 | Identify the circle of curvature, evolutes and involutes of the curves. | Apply |
| CO2 | Demonstrate various techniques to solve ordinary differential equations. | Apply |
| CO3 | Select Laplace transform to standard functions and solve initial value problems / differential equations . | Apply |
| CO4 | Find an analytic function ,when its real or imaginary part is known | Apply |
| CO5 | Classify the Singularities and its corresponding Residues for the given function | Apply |

## Course Contents:

| Module – I | APPLICATION OF DIFFERENTIAL CALCULUS | 12 |
|------------|--------------------------------------|----|

Curvature – Curvature in Cartesian co-ordinates - Centre and Radius of curvature- Circle of curvature- Evolutes and Involutes.

| Module – II | ORDINARY DIFFERENTIAL EQUATION | 12 |
|-------------|--------------------------------|----|

Higher order linear differential equations with constant coefficients – Method of variation of parameters – non-Homogenous equation - Euler and Legendre Equations.

| Module – III | LAPLACE TRANSFORMS | 12 |
|--------------|--------------------|----|

Laplace transform –Transform of elementary functions –Properties –Transforms of derivatives and integrals -Transform of periodic functions. Inverse Laplace transform –Statement and applications of Convolution theorem - Method of solving second order ordinary differential equations with constant coefficients by using Laplace transform technique.

| Module – IV | ANALYTIC FUNCTIONS | 12 |
|---|---|---|

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping : $w = a+z$, $az$, $1/z$ – Bilinear transformation.

| Module – V | COMPLEX INTEGRATION | 12 |
|---|---|---|

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

**Total: 60 Periods**

### Text Books:
1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2019.
2. Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons (Asia) Limited, 10th Edition, 2016.

### Reference Books:
1. Bali.N.P and ManishGoyal N.P, "A text book of Engineering Mathematics", Laxmi Publications, 6th Edition, 2015.
2. Ramana B.V, "Higher Engineering Mathematics",Tata McGraw Hill Publishing Company, 1st Edition, 2018.
3. Veerarajan T," Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd Edition 2017.

### Additional References:
1. https://onlinecourses.nptel.ac.in/noc24_ma12/preview
2. https://onlinecourses.swayam2.ac.in/cec24_ma10/preview
3. https://onlinecourses.nptel.ac.in/noc24_ma37/preview

**Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)**

| COs | Pos | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 3 | 3 | | | | | | | | | | | | |
| CO2 | 3 | 3 | 2 | | | | | | | | | | | | |
| CO3 | 3 | 2 | 2 | | | | | | | | | | | | |
| CO4 | 3 | 3 | 3 | | | | | | | | | | | | |
| CO5 | 3 | 3 | 3 | | | | | | | | | | | | |
| | 3 | High | | | | 2 | Medium | | | | | 1 | Low | | |

| Formative assessment | | | |
|---|---|---|---|
| Bloom's Level | Assessment Component | Marks | Total marks |
| Remember | Online Quiz | 5 | |
| Understand | Tutorial Class /Assignment | 5 | 15 |
| | Attendance | 5 | |

| Bloom's Category | Summative Assessment | | | |
| | Internal Assessment Exam | | | Final Examination (60) |
| | IAE I (5) | IAE II (10) | IAE III (10) | |
|---|---|---|---|---|
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 30 | 30 | 30 | 60 |
| Analyze | | | | |
| Evaluate | | | | |
| Create | | | | |

| 23EC201 | ELECTRONIC DEVICES | L | T | P | C |
|---------|--------------------|---|---|---|---|
|         |                    | 3 | 2 | 0 | 3 |

| Nature of Course | Professional Core |
|------------------|-------------------|
| Pre requisites | Fundamentals of Semiconductor Physics |

**Course Objectives**

The course is intended to

1. Understand about the characteristics of PN and Zener diodes
2. Gain knowledge about Bipolar Junction transistor and its properties
3. Learn the properties of FET and its current equations
4. Develop a clear understanding about special semiconductor devices
5. Explore the knowledge on Integrated Circuits

**Course Outcomes**

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|-------|----------------|---------------|
| CO 1 | Describe the characteristics of PN and Zener diodes | Understand |
| CO 2 | Interpret the Bipolar Junction transistor and its properties | Understand |
| CO 3 | Infer the properties of FET and its current equations | Understand |
| CO 4 | Categorize the various special semiconductor devices | Apply |
| CO 5 | Compare the types of integrated circuits | Understand |

**Course Contents**

| MODULE – I | BASICS CONCEPTS OF DIODE | 9 |
|------------|--------------------------|---|

PN junction diode, Current equations, Energy band diagram, diffusion and drift current densities, forward and reverse bias characteristics, transition and diffusion capacitances, Switching Characteristics, Breakdown in PN Junction Diodes- Zener diode- Zener breakdown.

| MODULE – II | BIPOLAR JUNCTION TRANSISTOR | 9 |
|-------------|----------------------------|---|

BJT–Types-Operations - Early Effect - Current equations - input and output characteristics of CE, CB, CC - Multi Emitter Transistor.

| MODULE – III | CHARACTERISTICS OF FET | 9 |
|--------------|------------------------|---|

JFETS -structure and operation- Drain and Transfer characteristics, -Current Equations-Pinch off voltage and its significance- MOSFET- structure and operation-Characteristics- Threshold voltage - D- MOSFET, E-MOSFET-Characteristics-Comparison of MOSFET with JFET.

| MODULE – IV | SPECIAL DEVICES | 9 |
|-------------|-----------------|---|

Thyristor devices: SCR, DIAC, TRIAC, UJT -Special Function Diodes: Schottky barrier diode-Varactor diode – Tunnel diode – LASER diode, LDR.

| MODULE – V | INTEGRATED CIRCUITS | 9 |
|---|---|---|

Integrated Circuit(IC)- Concepts- scale of integration -Classification of ICs–Analog IC and Digital IC-Comparison –Mixed signal integrated circuits-Fabrication process of monolithic ICs-Three-dimensional IC-Advantages.

**Total : 45 Periods**

## Text Books

1. Donald A Neaman. "Semiconductor Physics and Devices", Tata Mccraw Hill, Inc Fourth Edition'2012.
2. Salivahanan.S,SureshKumar . N, Vallavaraj.A, "Electronic Devices and circuits" Tata McGraw-Hill, Fourth Edition,2016

## Reference Books

1. Jacob. Millman, Christos C.Halkias, "Electronic Devices and Circuits", Tata Mccraw Hill Publishing Limited, Third Edition, New Delhi,2017
3. R.S.Sedh:, 'A Text Book of Applied Electronics",S.Chand and company Limited, Revised Edition. New Delhi 2018

## Additional References

1. www.circuitstoday.com
2. https://nptel.ac.in/courses/113/106/113106062/
3. https://www.cadence.com/en_US/home/explore/what-is-3dic.html

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | POs | | | | | | | | | | | | PSOs | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 2 |
| CO 1 | 2 | 3 | 2 | 3 | 2 | | | | | | | 1 | 3 | 2 | 2 |
| CO 2 | 3 | 3 | 2 | 3 | 2 | | | | | | | 1 | 3 | 2 | 2 |
| CO 3 | 2 | 3 | 2 | 2 | 2 | | | | | | | 1 | 3 | 2 | 2 |
| CO 4 | 3 | 2 | 2 | 3 | 2 | | | | | | | 1 | 3 | 2 | 2 |
| CO 5 | 3 | 3 | 2 | 3 | 3 | | | | | | | 2 | 3 | 2 | 2 |
| | 3-High | | | 2-Medium | | | 1-Low | | | | | | | | |

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| Summative Assessment | | | | |
|---|---|---|---|---|
| Bloom's Category | Internal Assessment Examinations (IAE) | | | Terminal Examinations |
| | IAE – I (5) | IAE – II (10) | IAE – III (10) | 60 |
| Remember | 10 | 10 | 30 | 40 |
| Understand | 40 | 40 | | 40 |
| Apply | | | 20 | 20 |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |

| Formative Assessment | | | |
|---|---|---|---|
| Bloom's Level | Assessment Component | Marks | Total marks |
| Remember | Classroom/Online Quiz | 5 | |
| Understand | Assignment | 5 | 15 |
| | Attendance | 5 | |

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| 23LET08 | தமிழரும் தொழில்நுட்பமும்<br>TAMILS AND TECHNOLOGY<br>(Common to all B.E. / B.Tech Programme) | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

| Nature of Course | Humanities and Sciences |
|---|---|
| Pre requisites | Tamil |

## Course Objectives

### The course is intended to

1. Introduce students to the great technology of ancient Tamil society.
2. Realize the contribution of various technologies for the development of governing area.
3. Highlighting the different manufacturing technology to make the coins, jewels, stones, art etc.
4. Know the role of agriculture, water management system and food processing.
5. Learn about the Scientific Tamil and Tamil computing of the past and how it has evolved over the generations.

## Course Outcomes

On successful completion of the course the students will be able to

| CO. No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Remember the life style and technology of the Sangam people. | Remember |
| CO 2 | Get an updated knowledge of ancient designing and construction of House, Temple, hero stones etc. | Understand |
| CO 3 | Learnt the speciality of manufacturing technology types and usages. | Understand |
| CO 4 | Gain the knowledge on production of agricultural products based on the ancient technologies. | Understand |
| CO 5 | Understand the evaluation of Tamil language through the digital system. | Understand |

## Course Contents (in Tamil)

| அலகு - I | நெசவு மற்றும் பானைத் தொழில்நுட்பம் | 2 |
|---|---|---|
| | சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில் நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள். | |

| அலகு - II | வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் | 2 |
|---|---|---|
| | சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு கட்டிடக் கலை - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை. | |

| அலகு - III | உற்பத்தித் தொழில் நுட்பம் | 2 |
|---|---|---|

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சன்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் -நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

| அலகு - IV | வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம் | 2 |
|---|---|---|

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குழுழிகள் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார்.

| அலகு - V | அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் | 2 |
|---|---|---|

அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

**Total : 10 Periods**

**Course Contents (in English)**

| Module – I | WEAVING AND CERAMIC TECHNOLOGY | 2 |
|---|---|---|

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

| Module – II | DESIGN AND CONSTRUCTION TECHNOLOGY | 2 |
|---|---|---|

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

| Module – III | MANUFACTURING TECHNOLOGY | 2 |
|---|---|---|

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.

| Module – IV | AGRICULTURE AND IRRIGATION TECHNOLOGY | 2 |
|---|---|---|

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.

| Module – V | SCIENTIFIC TAMIL & TAMIL COMPUTING | 2 |
|---|---|---|

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 : 10 Periods**

## பார்வை நூல்கள் (TEXT-CUM-REFERENCE BOOKS)

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நகரிகம் (தொல்லியல் துறைவெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

*Passed in Board of Studies Meeting on 28.12.2023*     *Passed in Academic Council Meeting on 11.01.2024*

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| 23PH201 | SOLID STATE PHYSICS | L | T | P | C |
|---|---|---|---|---|---|
| | (Common to BME, ECE and EEE) | 3 | 0 | 2 | 4 |

| Nature of Course | Basic Sciences |
|---|---|
| Pre requisites | Fundamentals of Basic Physics |

## Course Objectives

**The course is intended to**

1. Impart knowledge in production of laser and their applications in engineering and medical field.
2. Classify the types of fiber optics and their applications in advanced communication systems.
3. Understand on the concept and properties of matter like elasticity and its applications.
4. Learn the electronic properties of semiconductors and its applications.
5. Acquire the knowledge of dielectric and magnetic materials properties.

## Course Outcomes

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Compare the types of lasers for various industrial applications. | Understand |
| CO 2 | Realize the importance of different fibre optic communication systems. | Understand |
| CO 3 | Study the elastic behaviour and working of torsional pendulum. | Understand |
| CO 4 | Differentiate the types of semiconductor materials and its applications. | Apply |
| CO 5 | Solve the dielectric constant, susceptibility and losses. | Apply |

## Course Contents

| Module – I | LASER PHYSICS | 9 |
|---|---|---|

Lasers: Introduction- characteristics of laser - population of energy levels, Einstein's A and B coefficients derivation - resonant cavity - semiconductor lasers: homojunction and heterojunction - Applications of lasers - particle size determination and holography.

| Module – II | FIBER OPTICS | 9 |
|---|---|---|

Fiber Optics: Introduction – features of optical fiber- principle, numerical aperture and acceptance angle - types of optical fibers - fabrication of optical fiber–applications - optical fiber communication system - fiber optic sensors – temperature and displacement sensors - fiber optic endoscope.

| Module – III | PROPERTIES OF MATTER | 9 |
|---|---|---|

Elasticity - stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever - uniform and non-uniform bending - I-shaped girders.

| Module – IV | SEMICONDUCTOR PHYSICS | 9 |
|---|---|---|
| Introduction – properties – types - Intrinsic Semiconductors – energy band diagram – direct and indirect band gap semiconductors - carrier concentration of intrinsic semiconductors- extrinsic semiconductors (Qualitative) - N-type - P-type semiconductors –Hall effect – theory – experimental and its applications. | | |
| Module – V | DIELECTRIC AND MAGNETIC MATERIALS | 9 |
| Dielectric materials - Electronic, Ionic, Orientational and space charge polarization – dielectric constant- dielectric loss –classification of insulating materials and their applications - Introduction to magnetic materials - Soft and Hard magnetic materials – Ferromagnetic materials – Anti-ferromagnetic materials – Ferrites. | | |

**Total : 45 Periods**

## Laboratory Components (Any Five)

| S.No | List of Experiments | CO Mapping | RBT |
|---|---|---|---|
| 1 | Determination of wavelength and particle size of the given Laser beam. | CO1 | Apply |
| 2 | Determination of numerical aperture and acceptance angle of an optical fiber. | CO2 | Apply |
| 3 | Determination of the rigidity modulus of a given wire using Torsion pendulum. | CO3 | Apply |
| 4 | Determination of Young's modulus of a material by non-uniform bending method. | CO3 | Apply |
| 5 | Determination of Young's modulus of a material by uniform bending method. | CO3 | Apply |
| 6 | Determination of the band gap of a given semiconductor. | CO4 | Apply |
| | | **Total** | **15 Periods** |

## Text Books

1. Bhattacharya, D.K and Poonam, T, "Engineering Physics", Oxford University Press, 2nd edition, 2015.
2. M.N. Avadhanulu, M.N. &Kshirsagar PG. 'A Text book of Engineering Physics", S.Chand and company, Ltd., New Delhi, 10th edition, 2014.
3. William D.Callister,Jr and David. G.Bethwisch, "Materials Science and Engineering", John Wiley & Sons, Inc,9th edition, 2019.

## Reference Books

1. Halliday, D, Resnick, R and Walker, J, "Principles of Physics", Wiley, 10th edition, 2014.
2. Serway, R.A. & Jewett, J.W, "Physics for Scientists and Engineers", Cengage Learning, 9th edition, 2019.
3. Raghavan, V. "Materials Science and Engineering, A First course", PHI Learning, 5th edition, 2015.

**Web References:**

1. https://nptel.ac.in/courses/115/107/115107095/
2. https://www.coursera.org/lecture/fe-exam/stresses-in-beams-strains-in-pure-and-nonuniform-bending-6aMRx
3. https://nptel.ac.in/courses/115/105/115105099/#
4. https://www.youtube.com/watch?v=uv0LxMoalEQ

## Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

| COs | POs | | | | | | | | | | | | PSOs | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO 1 | 3 | 2 | 1 | | | | | | | | | | | |
| CO 2 | 3 | 1 | 1 | | | | | | | | | | | |
| CO 3 | 3 | 2 | 1 | | | | | | | | | | | |
| CO 4 | 3 | 1 | 1 | | | | | | | | | | | |
| CO 5 | 3 | | 1 | | | | | | | | | | | |
| | 3-High | | | 2-Medium | | | 1-Low | | | | | | | |

## Summative Assessment

| Bloom's Level | Continuous Assessment (IAE) | | | | | Final Examination (FE) [50marks] |
|---------------|------|------|------|------|------|------|
| | Theory Marks | | | | Practical | |
| | IAE-I [5] | IAE-II [10] | IAE-III [10] | Attendance [5] | Rubric based CIA [20 Marks] | |
| Remember | 12 | 12 | 12 | | | 30 |
| Understand | 34 | 34 | 28 | | 40 | 60 |
| Apply | 4 | 4 | 4 | | 60 | 4 |
| Analyse | | | 6 | | | 6 |
| Evaluate | | | | | | |
| Create | | | | | | |

| 23LEE02 | ADVANCED COMMUNICATIVE ENGLISH | L | T | P | C |
|---------|--------------------------------|---|---|---|---|
|         | (Common to all B.E. / B.Tech Programme) | 2 | 0 | 2 | 3 |
| Nature of Course | Humanities and Sciences | | | | |
| Pre requisites | Communicative English | | | | |

## Course Objectives
### The course is intended to
1. Hone professional communication skills, including email etiquette and formal presentation.
2. Develop advanced vocabulary and collocation for official communication.
3. Communicate effectively and actively in social interactions.
4. Improve writing skills such as project and report writing for various purposes.
5. Foster collaborative communication abilities through group discussion in diverse contexts.

## Course Outcomes
On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|-------|----------------|---------------|
| CO 1 | Communicate professionally in various contexts. | Understand |
| CO 2 | Make use of common English phrases and vocabulary. | Understand |
| CO 3 | Integrate basic English communication skills at a personal and a professional level in day-to- day interaction. | Apply |
| CO 4 | Implement listening, reading and writing skills in real - life situations | Apply |
| CO 5 | Decipher collaborative communication skills through diversified contexts. | Understand |

## Course Contents

| Module – I | TECHNICAL VOCABULARY AND USAGE | 9 |
|------------|--------------------------------|---|

**Grammar**: Technical Vocabulary (Synonyms and antonyms) - Articles - Reported Speech - **Listening**: Listening to video lectures (TED / INK Talks) **Speaking**: Describing pictures, places – Speaking practice to improve pronunciation **Reading**: Critical reading from the given text **Writing**: Job Application with Resume - E mail writing.

| Module – II | EFFECTIVE OFFICIAL COMMUNICATION | 9 |
|-------------|----------------------------------|---|

**Grammar**: Collocation – Question tags – Prepositions **Listening**: Listening to telephonic conversation **Speaking**: Role plays – Telephonic Etiquette and telephonic phrases **Reading**: Company profile - Advertisement (job / product) **Writing**: – Preparing Memo – Prepare Circular, Agenda and Minutes – Placing Order – Prepare Advertisement.

| Module – III | TECHNICAL LANGUAGE SKILLS FOR CONVERSATION | 9 |
|--------------|---------------------------------------------|---|

**Grammar**: Degrees of Comparison – Conjunctions **Listening**: Sports commentaries – Animated short stories **Speaking**: Asking for and giving directions – Describing simple process **Reading**: Reading and understand technical vocabulary **Writing**: Letter to the Editor – Review of Favourite Movie / Book – Recommendations.

Passed in Board of Studies Meeting on 28.12.2023        Passed in Academic Council Meeting on 11.01.2024

CHAIRMAN - BOARD OF STUDIES

| Module – IV | LANGUAGE FOR BUSINESS CORRESPONDENCE | 9 |
|---|---|---|

**Grammar:** Idioms and Phrases – Single line definitions Phrasal verbs **Listening:** Listening to informal communication **Speaking:** Narrating personal experience **Reading:** Speed reading – reading passage within the time limit **Writing:** Project writing – Report writing (Accident and Survey) – Preparing welcome address and vote of thanks.

| Module – V | VERBAL ABILITY FOR WRITING | 9 |
|---|---|---|

**Grammar:** Verbal Analogy – Cause and effect expressions **Listening:** Listening to Iconic Speeches - debate and reviewing the performance **Speaking:** Group communication skills – Discussing social issues and current affairs **Reading:** Short story – critical reading **Writing:** Itinerary –Interpretation of charts (Flow chart and Pie chart) - Essay Writing and Paragraph.

**Total : 45 Periods**

**Laboratory Components:**

| S.No | List of Experiments | CO Mapping | RBT |
|---|---|---|---|
| 1 | Describing Picture / Place | 1 | Understand |
| 2 | Listening | 1 | Understand |
| 3 | Role Play | 2 | Understand |
| 4 | Prepare Circular, Agenda & Minutes | 2 | Understand |
| 5 | Asking and Giving Directions | 3 | Apply |
| 6 | Narrate a Favourite Movie / Book | 3 | Apply |
| 7 | Welcome Address | 4 | Apply |
| 8 | Vote of Thanks | 4 | Apply |
| 9 | Discussing Social Issues | 5 | Understand |
| 10 | Interpretation of Charts | 5 | Understand |
| | | Total | 15 Periods |

**Text Books**

1. Rizvi, Ashraf.M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 8th Edition, 2020.
2. Hewings. M, "Advanced English Grammar", 3rd Edition, Cambridge University Press, Chennai, 9th Edition, 2019.
3. Board of Editors, "Using English – A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Private Limited, Hyderabad, 3rd Edition, 2019.

**Reference Books**

1. Dr. Krishnakumar TP, "Rudiments of Communication Skills", Buddha Publication, 1st Edition, 2023.
2. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 13th Edition, 2018.
3. Dhanavel S. P., "English and Soft Skills", 1st Edition, Orient Black Swan Private Limited, Hyderabad, 2010.

**Web References:**
1. https://nptel.ac.in/courses/111104031
2. https://nptel.ac.in/courses/111106139
3. https://nptel.ac.in/courses/111105134

**Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)**

| COs | Pos | | | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO 1 | | | | | | | | | 1 | 3 | 1 | | 2 | |
| CO 2 | | | | | | | | | 1 | 3 | 1 | | 2 | |
| CO 3 | | | | | | | | | 1 | 3 | 1 | | 2 | |
| CO 4 | | | | | | | | | 1 | 3 | 1 | | 2 | |
| CO 5 | | | | | | | | | 1 | 3 | 1 | | 2 | |
| | 3-High | | | 2-Medium | | | 1-Low | | | | | | | |

| | Summative assessment | | | | | |
|---|---|---|---|---|---|---|
| | Continuous Assessment (IAE) | | | | | Final Examination (FE) [50marks] |
| Bloom's Level | Theory Marks | | | | Practical | |
| | IAE-I [5] | IAE-II [10] | IAE-III [10] | Attendance [5] | Rubric based CIA [20 Marks] | |
| Remember | 25 | | | | 4 | 10 |
| Understand | 25 | 25 | 25 | | 8 | 20 |
| Apply | | 25 | 25 | | 8 | 20 |
| Analyse | | | | | | |
| Evaluate | | | | | | |
| Create | | | | | | |

| 23ME101 | Engineering Graphics (Common to Aeronautical, Agriculture, Civil, Mechanical, Safety and Fire Engineering & Food Technology) | L | T | P | C |
|---------|---|---|---|---|---|
| | | 1 | 0 | 4 | 3 |
| **Nature of Course** | Engineering Sciences | | | | |
| **Prerequisites** | Nil | | | | |

**Course Objectives:**

The course is intended to

1. Understand technical drawings in various fields of engineering

2. Imagine and visualize the geometric details of engineering objects.

3. Translate the geometric information of engineering objects into engineering drawings.

4. Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.

5. Visualize and draw isometric and perspective views

**Course Outcomes**

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---------|----------------|---------------|
| CO 1 | Develop the conic sections, special curves, and draw orthographic views from pictorial views. | Apply |
| CO 2 | Apply the principles of orthographic projections of points in all quadrants, lines and planes in first quadrant. | Apply |
| CO 3 | Construct the projections of simple solids like prisms, pyramids, cylinder and cone. | Apply |
| CO 4 | Build the sectional views of solids like cube, prisms, pyramids, cylinders & cones and development of its lateral surfaces. | Apply |
| CO 5 | Organize and draw isometric view of simple solids. | Apply |

**Course Contents**

**Concepts and Conventions (Not for Examination)** **1**

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

**UNIT -I       Plane Curves and Free Hand Sketching**                       **(3+12)**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three- Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

**UNIT –II       Projection of Lines and Plane Surface**                       **(3+12)**

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

(polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

### UNIT –III        Projection of Solids                                                    (3+12)

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

### UNIT- IV        Projection of Sectioned Solids and Development of Surface        (3+12)

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

### UNIT -V        Isometric Projections                                                    (3+12)

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

**TOTAL: (15+60) Periods**

### TEXT BOOKS
1.   Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011
2.   Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.

### REFERENCE BOOKS
1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill
Publishing Company Limited, New Delhi, 2008.
3. Parthasarathy N S and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

### Web References
1. http://nptel.ac.in/courses/112103019/Engineering drawing
2. http://pioneer.netserv.chula.ac.th/~kjirapon/self-practice.html

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

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

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**Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)**

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 |   |   |   |   |   |   |   |    |    | 1  | 2 |   |   |
| CO2 | 3 | 2 |   |   |   |   |   |   |   |    |    | 1  | 2 |   |   |
| CO3 | 3 | 2 |   |   |   |   |   |   |   |    |    | 1  | 2 |   |   |
| CO4 | 3 | 3 |   |   |   |   |   |   |   |    |    | 1  | 2 |   |   |
| CO5 | 3 | 2 |   |   |   |   |   |   |   |    |    | 1  | 2 |   |   |
|     | 3 | High | | | 2 | Medium | | | 1 | Low | | | | | |

| Summative assessment | | | | | | |
|---|---|---|---|---|---|---|
| **Bloom's Level** | **Continuous Assessment** | | | | | **Final Examination (Theory) [50 marks]** |
|  | **Theory** | | | | **Practical** |  |
|  | **IAE-I [ 5 ]** | **IAE-II [10]** | **IAE-III [10]** | **Attendance [5]** | **Rubric based CIA [20 Marks]** |  |
| Remember | 10 | 10 | 10 |   | 20 | 20 |
| Understand | 20 | 20 | 20 |   | 40 | 40 |
| Apply | 20 | 20 | 20 |   | 40 | 40 |
| Analyse |   |   |   |   |   |   |
| Evaluate |   |   |   |   |   |   |
| Create |   |   |   |   |   |   |

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| 23EC202 | ELECTRONIC DEVICES AND CIRCUITS LABORATORY | L | T | P | C |
|---------|--------------------------------------------|---|---|---|---|
| | | 3 | 2 | 0 | 3 |
| Nature of Course | Professional Core | | | | |
| Pre requisites | Knowledge about RLC and Semiconductor devices | | | | |

## Course Objectives

The course is intended to

1. Explore the characteristics of Diodes and BJT
2. Learn the characteristics of JFET
3. Compare the basic principle operations of thyristor devices.
4. Explore the knowledge on circuits and theorems.
5. Gain the functions on series and parallel circuits.

## Course Outcomes

1. Estimate the characteristics of devices and Bipolar junction transistor.
2. Demonstrate the input waveforms with required frequency and amplitude and obtain the characteristics of various diodes.
3. Acquire the skills in basic engineering practice.
4. Design the electronic circuits and synthesize the information
5. Design FET and obtain its characteristics and arrive at conclusions.

### Cycle 1

| CO.No | Course Outcome | CO | Bloom's Level |
|-------|----------------|----|----|
| CO 1 | Illustrate the characteristics of PN Junction diode and Zener diode. | 1 | Apply |
| CO 2 | Calculation of Common Emitter input and output characteristics. | 1 | Apply |
| CO 3 | Calculation of common base input and output Characteristics | 2 | Apply |
| CO 4 | Analysis of input and output Characteristics of JFET | 2 | Apply |
| CO 5 | Study the characteristics of SCR and Diac. | 5 | Apply |

### Cycle 2

| CO.No | Course Outcome | CO | Bloom's Level |
|-------|----------------|----|----|
| CO 1 | Design of RL and RC circuits. | 3 | Apply |

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| CO 2 | Analysis of KVL and KCL | 3 | Apply |
| CO 3 | Demonstrate Thevenin and superposition theorem | 4 | Apply |
| CO 4 | Analyze the characteristics of series and parallel RLC circuits | 3 | Apply |
| CO 5 | Integrated circuits design using Multisim | 4 | Apply |

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | POs | | | | | | | | | | | | PSOs | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO 1 | 3 | | | | | | | | 1 | | | 2 | 3 | | |
| CO 2 | 3 | | | | | | | | 1 | | | 2 | 3 | | |
| CO 3 | 3 | | | | | | | | 1 | | | 2 | 3 | | |
| CO 4 | 3 | | | | | | | | 1 | | | 2 | 3 | | |
| CO 5 | 3 | | | | | | | | 1 | | | 2 | 3 | | |
| | 3 | High | | | 2 | Medium | | | | | 1 | Low | | | |

| Summative assessment based on Continuous and End Semester Examination | | |
|---|---|---|
| Bloom's Category | Internal Assessment Examinations [50 marks ] | End Semester Examination [50 marks ] |
| Remember | 20 | 20 |
| Understand | 40 | 40 |
| Apply | 40 | 40 |
| Analyse | | |
| Evaluate | | |
| Create | | |

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| 23MC202 | ENVIRONMENTAL SCIENCES | L | T | P | C |
|---|---|---|---|---|---|
| | (Common for all branches) | 2 | 0 | 0 | 0 |
| Nature of Course | Mandatory, Non Credit | | | | |
| Pre requisites | Nil | | | | |

## Course Objectives

**The course is intended to**
1. Understand the concept of eco system and environment.
2. Become conversant with ecological balance and values of biodiversity.
3. Know the role of human in prevention of pollution and making a clean environment.
4. Get knowledge about conservation of non-conventional energy resources.
5. Study about the nature and management of e-waste and solid waste.

## Course Outcomes

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Explain the knowledge about ecosystem and environment | Understand |
| CO 2 | Interpret the ecological balance and preservation of bio diversity | Understand |
| CO 3 | Demonstrate various types of pollution in order to control pollution | Apply |
| CO 4 | Classify the energy sources for the conservation of non conventional energy sources | Understand |
| CO 5 | Identify the nature and management of e-waste and solid waste | Apply |

## Course Contents

| Module – I | ECOSYSTEM | 6 |
|---|---|---|

Eco system - Food chains, Food webs and Ecological pyramids. Ecosystem (a) Forest eco system, (b) Aquatic eco system (pond ecosystem and marine ecosystem).

| Module – II | BIODIVERSITY | 6 |
|---|---|---|

Introduction to Bio diversity, Values of Bio diversity, Threads to Bio diversity, Endangered and Endemic species of India, Hotspots of biodiversity. Conservation of Biodiversity: In-Situ and Ex-Situ conservation of biodiversity.

| Module – III | ENVIRONMENTAL POLLUTION | 6 |
|---|---|---|

Definition, Causes, Effects and Control of (a) Air pollution (b) Water pollution (c) Soil pollution. Electrostatic Precipitator for controlling air pollution.

| Module – IV | NON-CONVENTIONAL ENERGY RESOURCES | 6 |
|---|---|---|

Introduction, Types, Working and Applications of: Solar Energy- Photovoltaic (PV) solar energy, Wind Energy-Onshore wind power- and Geo Thermal Energy-Geo thermal power plant.

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| Module – V | ENVIRONMENTAL MANAGEMENT | 6 |
|---|---|---|
| Sustainable Development, Waste Management: Types, sources and disposal of municipal, industrial solid Waste, Role of Information technology in Environment and Human. COVID-19 and JN-1 Virus. | | |

**Total : 30 Periods**

## Activity Components

| S.No | List of Experiments | CO Mapping | RBT |
|---|---|---|---|
| 1 | Field study of simple eco system: pond, river and hill slopes | CO1 | Understand |
| 2 | Case study regarding environmental management | CO5 | Apply |

## Text Books

1. AnubhaKaushik and C.P. Kaushik, "Environmental Science and Engineering, New Age International Publishers, New Delhi, 2$^{nd}$ Edition, 2019.
2. V. Kumar, "An Introduction to Green Chemistry" Vishal publishing Co. Reprint Edition, 2020.

## Reference Books

1. Santosh Kumar Garg and Rajeshwari Garg "Ecological and Environmental Studies", Khanna Publishers, Nai Sarak, Delhi, 2$^{nd}$ Edition, 2019.
2. Masters, Gilbert M, "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi, 2$^{nd}$ Edition, 2020.

## Web References:

1. https://nptel.ac.in/courses/122103039/38
2. https://bch.cbd.int/cms/ui/collaboration/download/download.aspx?id=909
3. https://nptel.ac.in/courses/105102089/air%20pollution%20(Civil)/Module-3/3a.htm
4. www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
5. nptel.ac.in/courses/120108004/module7/lecture8.pdf

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | POs | | | | | | | | | | | | PSOs | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO 1 | | 3 | | | | | 1 | | | | | 3 | | |
| CO 2 | | 3 | | | | | 3 | | | | | 1 | | |
| CO 3 | | 3 | | | | | 2 | | | | | 3 | | |
| CO 4 | | 2 | | | | | 3 | | | | | 2 | | |
| CO 5 | | 3 | | | | | 3 | | | | | 2 | | |
| | 3-High | | | 2-Medium | | | 1-Low | | | | | | | |

| Bloom's Level | Summative Assessment | | | | |
|---|---|---|---|---|---|
| | Continuous Assessment | | | | |
| | IAE-I [20] | IAE-II [20] | IAE-III [20] | Attendance [20] | Activity [20] |
| Remember | 20 | 20 | 15 | | |
| Understand | 30 | 25 | 25 | | |
| Apply | | 5 | 10 | | |
| Analyze | | | | | |
| Evaluate | | | | | |
| Create | | | | | |

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| 23LEJ06 | | JAPANESE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | | 2 | 0 | 2 | 3 |
| Nature of Course | HSS | | | | | |
| Pre requisites | Nil | | | | | |

## Course Objectives

### The course is intended to

1. Read & Write Hiragana and Katakana (Japanese Alphabets) letters.
2. Use words and phrases of greeting in Japanese, identify names of objects and do a self-introduction using short and simple sentences.
3. Demonstrate the use of time-related words, verb conjunctions and make light conversation asking for directions and answering questions.
4. Express their likes and dislikes, hobbies, describe the locations of different things and demonstrate counting in Japanese.
5. Demonstrate the minimum day to day conversation and describe their ability and experiences.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1. | Read & Write Hiragana and Katakana (Japanese Alphabets) letters | Understand |
| CO2. | Identify names of objects and do self-introduction using short and simple sentences | Apply |
| CO3. | Demonstrate the use of time-related words | Apply |
| CO4. | Articulate their likes and dislikes, hobbies and describe the locations of different things | Apply |
| CO5. | Express day to day conversation and describe their ability to share their experiences | Understand |

## Course Contents

| Module – I | | 9 |
|---|---|---|
| INTRODUCTION- はじめまして – ALPHABET - Hiragana - NUMBERS- すうじ- Classroom Words- きょうしつのことば –LISTENING | | |
| Module – II | | 9 |
| ALPHABET-Katakana - BASIC SENTENCE- じぶんのなまえ – COUNTRY NAMES- くにのなまえ- SAYING AGE- なんさいですか - LISTENING | | |
| Module – III | | 9 |
| SAYING MONTH- なにつき – SAYING BIRTHDAY- たんじょうび - KAZOKU- かぞく - KNOWINGTHINGS- あ/こ/そ – LISTENING | | |

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| Module – IV | | 9 |
|---|---|---|
| PRONOUNS - ADJECTIVES - SAYING TIME, SHOPPING – LISTENING | | |
| Module – V | | 9 |
| SELF INTRODUCTION - MY TOWN - Watashino machi - GO, COME, RETURN - BASIC VERBS – TRANSPORT – LISTENING | | |
| | Total : 45 Periods | |

**Text Books**

1. Minna no Nihongo – Elementary Japanese 1
2. Minna no Nihongo- Translation & Grammar Notes 1
3. Gateway to Japan Japanese Language school e-handouts / e-course materials.

| | Summative Assessment | | | | | |
|---|---|---|---|---|---|---|
| Bloom's Level | Continuous Assessment | | | | | Final Examination (Theory) [50 marks] |
| | Theory Marks | | | | Practical | |
| | IAE-I [5] | IAE-II [10] | IAE-III [10] | Attendance [5] | Rubric based CIA [20 Marks] | |
| Remember | 50 | | | | 4 | 10 |
| Understand | | 20 | 20 | | 8 | 20 |
| Apply | | 30 | 30 | | 8 | 20 |
| Analyse | | | | | | |
| Evaluate | | | | | | |
| Create | | | | | | |

| 23MA301 | TRANSFORMS AND BOUNDARY VALUE PROBLEMS | L | T | P | C |
|---|---|---|---|---|---|
| | (Common to Aero, Agri, Civil, ECE, EEE, FDT, Mech, PCT, S&F) | 3 | 0 | 2 | 4 |
| **Nature of Course** | Basic Sciences | | | | |
| **Pre requisites** | Foundations of Mathematics | | | | |

## Course Objectives

The course is intended to

1. Learn about linear and non-linear partial differential equations and obtain their solutions using various techniques.
2. Gain familiarity with Fourier series.
3. Orient Fourier series techniques to solve one dimensional wave and heat equations.
4. Provide the concept of Fourier transforms and its inverse.
5. Introduce the concept of Z-transforms and difference equations.
6. Utilize advanced mathematical techniques to solve complex boundary value problems, reflecting mastery in mathematical transformations.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Identify linear and non-linear partial differential equations. | Apply |
| CO2 | Construct the Fourier series of a given function and apply in the field of Engineering. | Apply |
| CO3 | Interpret solutions of one dimensional wave and heat equations. | Apply |
| CO4 | Implement Fourier transforms in engineering field . | Apply |
| CO5 | Illustrate the Z-transforms and difference equations. | Apply |
| CO6 | Develop mathematical techniques to solve the boundary value problems. | Apply |

## Course Contents:

| Module – I | PARTIAL DIFFERENTIAL EQUATIONS | 9 |
|---|---|---|

Solution of standard types of first order non-linear partial differential equations: (i) $f(p,q)=0$, (ii) Clairaut's type - Lagrange's linear equation - linear partial differential equations of second order with constant coefficients of homogeneous equations.

| Module – II | FOURIER ANALYSIS | 9 |
|---|---|---|

Dirichlet's Conditions - Fourier series for periodic functions - Expansion of periodic functions with period $(0, 2\pi)$ and period $(-\pi, \pi)$ – Half Range Series - Root mean square value - Parseval's identity – Harmonic Analysis.

| Module – III | FOURIER TRANSFORMS | 9 |
|---|---|---|
| Statement of Fourier integral theorem – Fourier transforms pair: Fourier transforms and Inverse Fourier transforms – Fourier sine transforms -Fourier cosine transforms – Transforms of simple functions – Convolution Theorem - Parseval's Identity. | | |
| Module – IV | Z - TRANSFORMS AND DIFFERENCE EQUATIONS | 9 |
| Z-transforms - Properties – Inverse Z-transform: Partial fraction method and Convolution theorem - Formation of difference equations –Solution of difference equations using Z – transform. | | |
| Module – V | APPLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS | 9 |
| Classification of second order Partial differential equations – Method of separation of variables – Solutions of one dimensional wave equation – Solutions of one dimensional heat equation – Application to Boundary value problems. | | |

**Total: 45 Periods**

## Text Books:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., 3$^{rd}$ edition, 2016.
2. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 44$^{th}$ Edition, 2021.
3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 2014.

## Reference Books:

1. Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", Lakshmi Publications Pvt Ltd, 9$^{th}$ Edition, 2017.
2. Ramana.B.V,"Higher Engineering Mathematics", Tata Mc-Graw Hill Publishing Company Limited, 4$^{th}$ Edition, 2017.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Publications, 10$^{th}$ Edition, 2023.

## Additional References:

1. https://archive.nptel.ac.in/courses/111/101/111101153
2. https://www.youtube.com/watch?v=ygOjw0_Kh8k.
3. https://archive.nptel.ac.in/courses/111/106/111106111.

## Laboratory Components using MATLAB:

| S.No | List of Experiments | CO Mapping | RBT |
|---|---|---|---|
| 1 | Solutions of Clauirat's form | 1 | Apply |
| 2 | Solution of second order homogeneous differential equations with constant coefficients | 1 | Apply |
| 3 | Fourier Series in $(0, 2\pi)$ | 2 | Apply |
| 4 | Harmonic Analysis in Fourier Series | 2 | Apply |

| 5 | Fourier Transform | 3 | Apply |
|---|---|---|---|
| 6 | Inverse Fourier Transform | 3 | Apply |
| 7 | Z - Transform | 4 | Apply |
| 8 | Inverse Z - Transform | 4 | Apply |
| 9 | One dimensional wave equation | 5 | Apply |
| 10 | One dimensional heat equation | 5 | Apply |

Total: 30 Periods

## Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

| COs | Pos | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 | 1 | | | | | | | | | | 2 | | |
| CO2 | 3 | 2 | 2 | | | | | | | | | | 2 | | |
| CO3 | 3 | 2 | 1 | | | | | | | | | | 2 | | |
| CO4 | 3 | 2 | 1 | | | | | | | | | | 1 | | |
| CO5 | 3 | 3 | 2 | | | | | | | | | | 2 | | |
| CO6 | 3 | 2 | 2 | | | | | | | | | | 2 | | |
| | 3 | High | | | 2 | Medium | | | | | 1 | | Low | | |

| Bloom's Level | Summative Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| | Continuous Assessment | | | | | | Final Examination (Theory) [50] |
| | Theory | | | Practical | | | |
| | IAE I (5) | IAE II (10) | IAE III (10) | Attendance [5] | Rubric based [10] | Model Exam [10] | |
| Remember | 10 | 10 | 10 | | | | 10 |
| Understand | 10 | 10 | 10 | | 40 | 40 | 30 |
| Apply | 30 | 30 | 30 | | 60 | 60 | 60 |
| Analyze | | | | | | | |
| Evaluate | | | | | | | |
| Create | | | | | | | |

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| 23EC301 | SIGNALS AND SYSTEMS | L | T | P | C |
|---------|---------------------|---|---|---|---|
|         |                     | 3 | 1 | 0 | 4 |

| Nature of Course | Professional Core |
|------------------|-------------------|
| Pre requisites   | Mathematics for Electrical Science |

## Course Objectives:

The course is intended to

- Understand the classification of signals and systems
- Study the Continuous Time signals in Fourier series.
- Discuss the discrete time signals and systems using Discrete Fourier transform and Z Transform.
- Learn the continuous time signals and systems using Laplace Transform and Fourier transform
- Study the concept of LTI systems and solutions

## Course Outcomes:

On successful completion of the course the students will be able to

| CO No. | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO 1 | Illustrate the basic concepts of signals and systems & its classifications. | Apply |
| CO 2 | Learn the CT signals using Fourier series. | Understand |
| CO 3 | Explore the discrete time signals using Discrete Time Fourier Transform and Z Transform.. | Apply |
| CO 4 | Study the continuous time signals and systems using Fourier Transform | Understand |
| CO 5 | Solve the solution for Continuous Time and Discrete Time differential equation | Apply |
| CO 6 | Apply the various signals and system with different transformation technique. | Apply |

## Course Contents

| Module – I | Classifications of Signals and Systems | 12 |
|------------|----------------------------------------|----|

Introduction to signals and systems _ Elements of signals _ Representations of signals _ Basic operation of signals – Classifications of signals and systems

| Module – II | Analysis of Continuous Time Signals | 12 |
|-------------|-------------------------------------|----|

Introduction to Fourier series Dirchlet's conditions Representation of Fourier series – Existence of Fourier series Trigonometric Fourier series Exponential Fourier series.   -

| Module – III | Analysis of Discrete Time Signals | 12 |
|--------------|-----------------------------------|----|

Sampling theorem and Nyquist rate, Introduction to DTFT- Properties–Frequency Response - Introduction to Z transform - Properties- Inverse Z-transform- Region of Convergence.

| Module – IV | Analysis of Continuous Time Systems | 12 |
|-------------|-------------------------------------|----|

Introduction to Fourier Transform- Existence of Fourier Transform- properties of Fourier transform- System analysis with Fourier transforms.

| Module – V | Analysis of LTI Systems | 12 |
|------------|-------------------------|----|

Solution of Differential equations in continuous systems - Convolution integrals, Solution for differential equation in discrete system- Convolution sum.

Total : 60 Periods

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**Text Books :**
1. Allan V. Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson publication, Second edition, 2018.
2. P.Rameshbabu and R.Anand natrajan " Signals and Systems" SciTech Publication, Fifth edition,2022..

**Reference Books :**
1. J.S Katre, Dhanajay K.Theckedath " Signals and systems", Knowledge publication- fourth edition, 2018.
2. A.Nagoorkani "Signals and systems" Mchraw Hill Publication, Third Edition, 2015.
3. M.Anand kumar " Signals and systems" PHI Publishers, Third Edition ,2011.

**Additional References:**
1. https://archive.nptel.ac.in/courses/108/104/108104100//
2. https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/video_galleries/video-lectures/

### Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)

| Cos | Pos | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 | 1 | 1 | | | | | | | | | 3 | 3 | 1 |
| CO2 | 3 | 2 | 1 | 1 | | | | | | | | | 3 | 3 | 1 |
| CO3 | 3 | 2 | 1 | 1 | | | | | | | | | 3 | 3 | 1 |
| CO4 | 3 | 2 | 1 | 1 | | | | | | | | | 3 | 3 | 1 |
| CO5 | 3 | 2 | 1 | 1 | | | | | | | | | 3 | 3 | 1 |
| CO6 | 3 | 2 | 1 | 1 | | | | | | | | | 3 | 3 | 1 |
| | 3 | High | | | 2 | | Medium | | | | 1 | | Low | | |

### Formative assessment

| Blooms Level | Assessment Component | Marks | Total marks |
|-----|-----|-----|-----|
| Analyze | Tutorial | 5 | |
| Understand | Assignment | 5 | 15 |
| | Attendance | 5 | |

### Summative Assessment

| Category Bloom's | Continuous Assessment Tests | | | Terminal Examination (60) |
|-----|-----|-----|-----|-----|
| | IAE I (5) | IAE II (10) | IAE III (10) | |
| Remember | | | | |
| Understand | 25 | 25 | 25 | 40 |
| Apply | 25 | 25 | 25 | 60 |
| Analyze | | | | |
| Evaluate | | | | |
| Create | | | | |

Passed in Board of Studies

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| 20EC302 | ANALOG ELECTRONICS | L | T | P | C |
|---------|--------------------|---|---|---|---|
|         |                    | 3 | 1 | 0 | 4 |

| Nature of Course | Professional Core |
|------------------|-------------------|
| Pre requisites   | Electronic Devices |

## Course Objectives

### The course is intended to

1. Learn the methods of biasing of BJT and JFET.
2. Study the concepts BJT amplifiers.
3. Learn the basic operations of feedback circuits.
4. Acquire the knowledge of various types of oscillator circuits.
5. Explore the basic operations of power amplifiers.

## Course Outcomes

On successful completion of the course the students will be able to

| CO No. | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO1 | Describe the biasing of BJT and JFET. | Understand |
| CO2 | Interpret the concept of BJT amplifiers and its frequency response. | Understand |
| CO3 | Illustrate the types of feedback amplifier and its characteristics. | Apply |
| CO4 | Construct the circuits of various oscillators. | Apply |
| CO5 | Explain the basics operations of power amplifiers. | Understand |
| CO6 | Design of different oscillating circuits with different operating frequencies. | Analyze |

## Course Contents

| Module – I | Biasing of BJT and JFET | 12 |
|------------|-------------------------|-----|

BJT, Need for biasing, A.C and D.C load lines, bias point, DC analysis of transistor circuits, various biasing methods of BJT, Thermal stability, stability factors, various biasing methods of JFET, JFET –D.C load lines and bias point, voltage divider bias, fixed bias, common emitter fixed bias.

| Module – II | BJT amplifiers | 12 |
|-------------|----------------|-----|

Amplifier frequency response, frequency response of the transistor amplifiers with circuits capacitors, Darlington amplifier, Bootstrap amplifier, Cascade and cascode amplifier configuration, differential amplifier, comparison of various amplifiers.

| Module – III | Feedback amplifier circuits | 12 |
|--------------|-----------------------------|-----|

Feedback concepts, Feedback connection types, general characteristics of negative feedback topologies, voltage series feedback, current series feedback, voltage shunt feedback, current shunt feedback.

| Module – IV | Oscillators | 12 |
|-------------|-------------|-----|

Classifications of oscillators, Barkhausen criterion, Hartley oscillator, Colpits oscillator, Clapp oscillator, RC phase shift oscillator, Wien bridge oscillator, crystal oscillator, ring oscillator, frequency stability of the oscillation.

| Module – V | Power amplifiers | 12 |
|------------|------------------|-----|

Definition and amplifier types, class A amplifier, transformer coupled audio amplifier, calculation of efficiency, push pull amplifier, class B, class AB amplifiers, amplifier distortion, comparison of various amplifiers.

**Total : 60 Periods**

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**Text Books**
1. Millman J,Halkias.C and Sathyaprada Jit "Electronics Devices and Circuits" Mc Graw Hill education(India) private limited,fourth Edition,2022.
2. S.Saliavahanan and N.Suresh Kumar", Electron Devices and Circuits,"Tata Mc Graw Hill fifth Edition, 2022.

**Reference Books**
1. K.Lal Kishore,"Electron Devices and Circuits", B.S Publications,Nov.2016.
2. G.S.N.Raju,"Electron Devices and Circuits," Published by I.K International, New Delhi 2006.

**Additional References**
1. **NPTEL** - https://onlinecourses.nptel.ac.in/noc23_ee77/preview

### Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)

| Cos | Pos | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 | 1 | 2 | | | | | | | | 2 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 2 | 1 | | | | | | | | 1 | 3 | 2 | 2 |
| CO3 | 3 | 2 | 1 | 2 | | | | | | | | 2 | 3 | 2 | 2 |
| CO4 | 3 | 2 | 2 | 1 | | | | | | | | 1 | 3 | 2 | 2 |
| CO5 | 3 | 2 | 2 | 2 | | | | | | | | 2 | 3 | 2 | 2 |
| CO6 | 3 | 2 | 2 | 1 | | | | | | | | 1 | 3 | 2 | 2 |
| | 3 | High | | | 2 | | Medium | | | | | | Low | | |

### Formative assessment

| Blooms Level | Assessment Component | Marks | Total marks |
|--------------|---------------------|-------|-------------|
| Analyze | Tutorial | 5 | |
| Understand | Assignment | 5 | 15 |
| | Attendance | 5 | |

### Summative Assessment

| Category Bloom's | Continuous Assessment Tests | | | Terminal Examination (60) |
|------------------|-------|--------|---------|---------------------------|
| | IAE I (5) | IAE II (10) | IAE III (10) | |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 30 | 30 | 20 | 60 |
| Apply | 10 | 10 | 10 | 10 |
| Analyze | | | 10 | 10 |
| Evaluate | | | | |
| Create | | | | |

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| 23EC303 | Digital Logic Design | L | T | P | C |
|---------|----------------------|---|---|---|---|
|         |                      | 3 | 0 | 0 | 3 |

| Nature of Course | Professional Core |
|------------------|-------------------|
| Pre requisites | Electronic Devices and Circuits |

## Course Objectives
The course is intended to
1. Study the fundamentals of digital circuits and simplification methods.
2. Expose the design concepts of various combinational circuits using logic gates.
3. Learn the analysis and design procedures of synchronous sequential circuits.
4. Know the design procedures of an asynchronous sequential circuit.
5. Explore the functionality of semiconductor memories and PLDs.

## Course Outcomes
On successful completion of the course the students will be able to

| CO No. | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO 1 | Describe the minimization techniques of Boolean functions to realize digital circuits. | Apply |
| CO 2 | Construct the combinational circuits using logic gates. | Apply |
| CO 3 | Design the sequential circuits using logic gates and flip flops. | Apply |
| CO 4 | Analyze and design asynchronous sequential circuits. | Analyze |
| CO 5 | Explain the semiconductor memories and Programmable Logic devices. | Understand |
| CO 6 | Implement the combinational and sequential circuits using Verilog HDL. | Apply |

## Course Contents

| Module – I | Digital Fundamentals | 9 |
|------------|----------------------|---|

Number Systems – representation and conversions, 1s and 2s complements, Binary Codes - BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems & postulates, Boolean expression minimization, Logic gates, Sum of products and product of sums, Minterms and Maxterms, Minimization of Boolean expressions using Karnaugh map, Introduction to Verilog HDL - Module declaration – data types – Modelling techniques.

| Module – II | Combinational Logic Circuits | 9 |
|-------------|------------------------------|---|

Design of combinational circuits – Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder - Carry look ahead Adder, BCD Adder, Multiplexer, De-Multiplexer, Encoder, Decoder, Priority Encoder, Verilog HDL models for the combinational circuits - full adder, full subtractor, multiplexer, demultiplexer, encoder and decoder.

| Module – III | Synchronous Sequential Circuits | 9 |
|--------------|----------------------------------|---|

Flip flops - SR, JK, T, D, Master/Slave Flipflops, Triggering of FF, Analysis and design of clocked sequential circuits - Design - Moore/Mealy models, state minimization, state assignment, circuit implementation - Design of Counters - Ripple Counters, Ring Counters, Shift registers, Universal Shift Register, Verilog HDL models for the Sequential circuits - Flip-Flops, universal shift register, counters.

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| Module – IV | Asynchronous Sequential Circuits | 9 |
|---|---|---|

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Cycles and Races - Race-free State Assignment - Fundamental and Pulse mode sequential circuits – Hazards, Design of Hazard free circuits.

| Module – V | Memory and Programmable Logic Devices | 9 |
|---|---|---|

Basic memory structure - ROM - PROM - EPROM - EEPROM, RAM - Static and dynamic RAM - Programmable Logic Devices - Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PLA and PAL.

**Total : 45 Periods**

### Text Books

1. Morris Mano. M and Michael D. Ciletti, "Digital Design", Pearson Publication, Sixth Edition 2018.
2. Salivahanan. S and Arivazhagan. S, "Digital Circuits and Design", Oxford University Press, Fifth Edition, 2018.

### Reference Books

1. A. Anand Kumar, "Fundamentals of Digital Circuits", PHI Learning Private Limited, Fourth Edition, 2016.
2. Charles H. Roth, Larry L. Kinney, Raghunandan G. H. "Fundamentals of Logic Design", Cengage India Pvt Ltd, First Edition, 2019.
3. Thomas L. Floyd," Digital Fundamentals", Pearson Publication, Eleventh Edition, 2017.

### Additional References

1. **NPTEL** - https://nptel.ac.in/courses/108/105/108105132/
2. **MOOC Courses**- https://www.mooc-list.com/course/digital-systems-logic-gates-processors-coursera.

| COs | PO's | | | | | | | | | | | | PSO's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO 1 | 3 | 3 | 1 | 2 | | | | | | | | 2 | 1 | 1 | 1 |
| CO 2 | 3 | 3 | 3 | 2 | | | | | | | | 2 | 1 | 1 | 1 |
| CO 3 | 3 | 3 | 3 | 2 | | | | | | | | 2 | 2 | 2 | 2 |
| CO 4 | 3 | 3 | 2 | 2 | | | | | | | | 2 | 2 | 2 | 2 |
| CO 5 | 3 | 2 | 2 | 1 | | | | | | | | 2 | 1 | 1 | 1 |
| CO 6 | 3 | 2 | 2 | 2 | | | | | | | | 2 | 2 | 2 | 2 |
| | 3-High | | | 2-Medium | | | | 1- Low | | | | | | | |

Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

| Formative Assessment | | | |
|---|---|---|---|
| Blooms Taxonomy | Assessment Component | Marks | Total marks |
| Remember | Quiz | 5 | |
| Understand | Tutorial class / Assignment | 5 | 15 |
| Apply | | | |
| | Attendance | 5 | |

| Summative Assessment | | | | |
|---|---|---|---|---|
| Bloom's Category | Internal Assessment Examinations (IAE) (40) | | | Final Examinations (FE) (60) |
| | IAE – I (5) | IAE – II (10) | IAE – III (10) | (60) |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 20 | 20 | 20 | 40 |
| Analyse | 10 | 10 | 10 | 20 |
| Evaluate | | | | |
| Create | | | | |

| 23CS302 | OOPS AND DATA STRUCTURES | L | T | P | C |
|---|---|---|---|---|---|
| **Nature of Course** | Engineering Sciences | 3 | 0 | 0 | 3 |
| **Pre requisites** | NIL | | | | |

## Course Objectives

The course is intended to
1. Understand the basic concepts of OOPs using C++.
2. Comprehend the fundamentals of member functions and classes.
3. Learn the concepts of Data Structures using C++.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Explain basics of C++. | Understand |
| CO2 | Build programs using member function and classes. | Apply |
| CO3 | Implement inheritance and polymorphism. | Apply |
| CO4 | Experiment with linear and non-linear data structures. | Apply |
| CO5 | Develop applications to perform various sorting techniques. | Apply |
| CO6 | Implement the concept of searching. | Apply |

## Course Contents:

### MODULE - I  INTRODUCTION
9

Basic concepts of OOPs - C++ Introduction – functions – Class - Scope and Accessing Class Members – Reference Variables – Initialization – Constructor – Destructor.

### MODULE - II  MEMBER FUNCTION
9

Class Members – Friend Function – Recursion - Parameter Passing - Dynamic Memory Allocation – Storage Classes – Arrays – Arrays to Function - Multidimensional arrays.

### MODULE - III INHERITANCE AND POLYMORPHISM
9

Inheritance - Base Classes and Derived Classes – Protected Members – Casting Class pointers– Constructors and Destructors in derived Classes - Polymorphism – Overloading - Function and Operator Overloading- Virtual functions – This Pointer – Dynamic Binding.

### MODULE – IV LINEAR AND NON-LINEAR DATA STRUCTURES
9

Abstract Data Types (ADTs) – List ADT - Array-based implementation – Singly linked list implementation- Stack ADT - Array-based implementation – Trees – Binary Trees – Binary tree representation and traversals.

### MODULE - V  SEARCHING AND SORTING ALGORITHMS
9

Sorting algorithms - Insertion sort – Quick sort – Merge sort – Searching - Linear search – Binary Search.

**Total: 45 Periods**

## Text Books:

1. Deitel and Deitel, "C++, How To Program", Pearson Education, 12th Edition, 2021.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Addison Wesley, 6th Edition, 2020.

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**Reference Books:**

1. Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2019.
2. Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", Fourth Edition, 2018.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Mc Graw Hill, Fourth Edition, 2022.
4. D.Ravinchandran, "Programming with C++", McGraw Hill Education, Third edition, 2017.

**Additional References:**

1. https://nptel.ac.in/courses/106/106/106106145/
2. https://www.coursera.org/learn/cs-fundamentals-1

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **POs** | | | | | | | | | | | | **PSOs** | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | |
| CO1 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 | |
| CO2 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 | |
| CO3 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 | |
| CO4 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 | |
| CO5 | 3 | 3 | 3 | '2 | 3 | | | | | | | 3 | 3 | 3 | 3 | |
| CO6 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 | |
| | 3 | High | | | 2 | | Medium | | | | 1 | | Low | | | |

| Formative assessment | | | |
|---|---|---|---|
| **Bloom's Level** | **Assessment Component** | **Marks** | **Total marks** |
| Remember | Classroom or Online Quiz | 5 | |
| Understand | Class Presentation/Power point presentation | 5 | 15 |
| | Attendance | 5 | |

| Summative Assessment | | | |
|---|---|---|---|
| **Bloom's Category** | **Continuous Assessment Tests** | | **Terminal Examination (60)** |
| | IAE1 (5) | IAE2 (10) | IAE3 (10) |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 20 | 20 | 20 | 50 |
| Apply | 20 | 20 | 20 | 30 |
| Analyze | 0 | 0 | 0 | 0 |
| Evaluate | 0 | 0 | 0 | 0 |
| Create | 0 | 0 | 0 | 0 |

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| 23UH001 | UNIVERSAL HUMAN VALUES (Common to all B.E. / B.Tech Programme) | L | T | P | C |
|---------|---------------------------------------------------------------|---|---|---|---|
|         |                                                               | 3 | 0 | 0 | 3 |
| **Nature of Course** | Humanities and Sciences | | | | |
| **Pre requisites** | Nil | | | | |

## Course Objectives
The course is intended to
1. Encourage respect for the inherent dignity and worth of all individuals, regardless of differences in race, ethnicity, gender, religion, or socioeconomic status.
2. Cultivate empathy and compassion towards others, promoting understanding and solidarity across diverse communities.
3. Promote peaceful coexistence and harmony among individuals and communities.
4. Foster a sense of responsibility towards the environment and future generations, promoting sustainable practices and conservation efforts.
5. Hold and celebrate cultural diversity, recognizing the richness and value of different traditions, languages, and perspectives.
6. Contribute to the realization of universal human values and create a more just, compassionate, and sustainable world.

## Course Outcomes
On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|-------|----------------|---------------|
| CO 1 | Embrace values such as empathy, tolerance, and respect can lead to decreased conflict and violence, both at interpersonal and societal levels. | Understand |
| CO 2 | Support values like equality, justice, and human rights can lead to more equitable societies, where everyone has access to opportunities and resources | Understand |
| CO 3 | Emphasize values such as empathy, compassion, and honesty fosters healthier and more meaningful relationships among individuals and groups. | Apply |
| CO 4 | Grasp values of environmental stewardship and responsibility contributes to sustainable development practices that preserve natural resources. | Apply |
| CO 5 | Celebrate cultural diversity and promoting values of inclusivity and acceptance enriches societies by fostering creativity, innovation, and mutual understanding | Understand |
| CO 6 | Create a world that is more just, compassionate, and sustainable for all. | Apply |

## Course Contents

| Module – I | NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION | 9 |
|------------|----------------------------------------------------------------|---|

Purpose and motivation for the course, recapitulation from Universal Human Values-I - Self-Exploration – what is it? – Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration – Continuous Happiness and Prosperity-A look at basic Human Aspirations - Right understanding, Relationship and Physical Facility - the basic requirements for fulfilment of aspirations of every human being with their correct priority – Understanding Happiness and Prosperity correctly -

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A critical appraisal of the current scenario – Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

| Module – II | UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF! | 9 |
|---|---|---|

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' – Understanding the needs of Self ('I') and 'Body'- happiness and physical facility – Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) – Understanding the characteristics and activities of 'I' and harmony in 'I' – Understanding the harmony of I with the Body : Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health.

| Module – III | UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN- HUMAN RELATIONSHIP | 9 |
|---|---|---|

Understanding values in human - human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship – Understanding the meaning of Trust; Difference between intention and competence - Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship – Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals – Visualizing a universal harmonious order in society-Undivided Society, Universal Order- from family to world family.

| Module – IV | UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE-WHOLE EXISTENCE AS COEXISTENCE | 9 |
|---|---|---|

Understanding the harmony in the Nature – Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature – Understanding Existence as Co-existence of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence.

| Module – V | IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS | 9 |
|---|---|---|

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order - Competence in professional ethics – Case studies of typical holistic technologies, management models and production systems – Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

**Total : 45 Periods**

### Text Books
1. Premvir Kapoor, Professional Ethics and Human Values, Khanna Book Publishing, New Delhi, 2022.
2. R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.
3. A N Tripathy, Human Values, New Age International Publishers, 2003.

### Reference Books
1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
3. Human Values, A. N. Tripathi, New Age Intl.Publishers, NewDelhi, 2004.

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## Web References

1. https://www.studocu.com/in/document/i-k-gujral-punjab-technical-university/universal-human-values/uhv-complete-notes/46743542.
2. https://www.youtube.com/watch?v=NhFBzn5qKIM&list=PLWDeKF97v9SO8vvjC1Kyqte ziTbTjN1So
3. https://www.youtube.com/watch?v=Ff0LUTOCuLE&list=PLWDeKF97v9SO8vvjC1Kyqte ziTbTjN1So&index=16

### Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

| COs | Pos | | | | | | | | | | | | PSOs | |
| --- | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO 1 | | | | | | | | | 1 | 2 | 1 | | 1 | |
| CO 2 | | | | | | | | | 1 | 2 | 1 | | 1 | |
| CO 3 | | | | | | | | | 1 | 2 | 1 | | 1 | |
| CO 4 | | | | | | | | | 1 | 2 | 1 | | 1 | |
| CO 5 | | | | | | | | | 1 | 2 | 1 | | 1 | |
| | 3-High | | | | 2-Medium | | | | 1-Low | | | | | |

### Formative assessment

| Bloom's Level | Continuous Assessment (IAE) | | Total marks |
| --- | --- | --- | --- |
| | Assessment component | Marks | |
| Remember | Online Quiz | 5 | |
| Understand | Tutorial class/Assignment | 5 | 15 |
| | Attendance | 5 | |

### Summative assessment

| Bloom's Level | Continuous Assessment (IAE) Theory Marks | | | Final Examination [60 marks] |
| --- | --- | --- | --- | --- |
| | IAE-I [5] | IAE-II [10] | IAE-III [10] | |
| Remember | 20 | 10 | 10 | 10 |
| Understand | 30 | 20 | 20 | 20 |
| Apply | | 20 | 20 | 20 |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |

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| | | L | T | P | C |
|---|---|---|---|---|---|
| **23EC304** | **ANALOG AND DIGITAL CIRCUITS LABORATORY** | 0 | 0 | 2 | 1 |
| **Nature of Course** | Professional Core | | | | |
| **Pre requisites** | Electronic Devices and Circuits & Digital Electronics | | | | |

**Course Objectives:**

The course is intended to

1. Study the transfer characteristics of various amplifiers.
2. Impart the design concepts of differential amplifier.
3. Learn the performance of various oscillators.
4. Realize the design concepts of combinational and sequential logic circuits.
5. Execute the simulation of analog and digital circuits.

**Course Outcomes:**

| CO.No | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Estimate the frequency response of CE, CB and CC amplifiers. | Apply |
| CO2 | Determine the CMRR of differential amplifiers. | Apply |
| CO3 | Analyze the performance and frequency range of oscillators. | Analyze |
| CO4 | Construct combinational and sequential logic circuits using logic gates and flip flops. | Apply |
| CO5 | Design and measure the performance of various amplifier circuits using SPICE. | Apply |
| CO6 | Simulate and synthesize digital circuits using Xilinx ISE. | Apply |

**Analog Experiments:**

| S.No. | List of Experiments | CO | RBT |
|---|---|---|---|
| 1. | Analyze the Frequency Response of CE, CB and CC amplifiers. | CO1 | Apply |
| 2. | Design and measure the CMRR of differential amplifier. | CO2 | Apply |
| 3. | Design and analysis of Darlington Amplifier. | CO2 | Apply |
| 4. | Construction and analysis of Hartley and Colpitts Oscillator. | CO3 | Apply |
| 5. | Design and simulation using SPICE<br>i) BJT with fixed bias and voltage divider bias.<br>ii) Cascade and cascode amplifier. | CO5 | Apply |

**Digital Experiments:**

| S.No. | List of Experiments | CO | RBT |
|---|---|---|---|
| 1. | Design and implementation of Binary to Gray and Gray to Binary code converters using logic gates. | CO4 | Apply |
| 2. | Design and implementation of 4 bit binary Adder/Subtractor using IC 7483. | CO4 | Apply |
| 3. | Design and implementation of Multiplexer and De-multiplexer using logic gates. | CO4 | Apply |
| 4. | Construction and verification of shift registers and counters using flipflops. | CO4 | Apply |
| 5. | Design and simulation using Xilinx ISE<br>i) Full Adder and Full Subtractor<br>ii) Flipflops | CO6 | Apply |

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## Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)

| Cos | Pos | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 3 | 2 | | | | | | | | | | 3 | 2 | 1 |
| CO2 | 3 | 3 | 2 | | | | | | | | | | 3 | 2 | 2 |
| CO3 | 3 | 3 | 2 | | | | | | | | | | 3 | 2 | 2 |
| CO4 | 3 | 3 | 2 | | | | | | | | | | 3 | 2 | 2 |
| CO5 | 3 | 3 | 2 | | | | | | | | | | 3 | 2 | 2 |
| CO6 | 3 | 3 | 2 | | | | | | | | | | 3 | 2 | 2 |
| | 3 | | High | | | 2 | | | Medium | | | 1 | | Low | |

| Assessment based on Continuous and Final Examination | | | |
|---|---|---|---|
| Bloom's Level | Continuous Assessment [50 marks] (Attendance-5 marks) | | Final Examination [50 marks] |
| | Rubrics Continuous Assessment [25 marks] | Model Examination [20 Marks] | |
| Remember | 10 | 10 | 20 |
| Understand | 20 | 20 | 40 |
| Apply | 20 | 20 | 40 |
| Analyze | | | |
| Evaluate | | | |
| Create | | | |

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| 23CS303 | OOPS AND DATA STRUCTURES LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **Nature of Course** | Engineering Sciences | | | | |
| **Pre requisites** | NIL | | | | |

## Course Objectives

The course is intended to
1. Understand the basic concepts of OOPs using C++.
2. Comprehend the fundamentals of member functions and classes.
3. Learn the concepts of Data Structures using C++.

## Course Outcomes

On successful completion of the course, students will be able to

| CO.No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Experiment with various control structures in C++ | Apply |
| CO2 | Apply the concepts of functions in C++. | Apply |
| CO3 | Make use of inheritance in C++. | Apply |
| CO4 | Experiment with linear and non linear data structures using C++. | Apply |
| CO5 | Develop applications to perform various sorting using C++. | Apply |
| CO6 | Implement the concept of searching using C++. | Apply |

## Laboratory components

| S.No | List of Experiments | CO Mapping | RBT |
|---|---|---|---|
| 1 | Develop simple C++ programs using Control structures. | CO1 | Apply |
| 2 | Implement constructors and destructors in C++. | CO1 | Apply |
| 3 | Build a C++ program with member functions and friend functions. | CO2 | Apply |
| 4 | Write a C++ program to use pointer for both base and derived classes and call the member function. | CO2 | Apply |
| 5 | Write C++ program to demonstrate operator overloading. | CO3 | Apply |
| 6 | Make use of inheritance in C++ application | CO3 | Apply |
| 7 | Build a C++ program to perform list operations using linked list. | CO4 | Apply |
| 8 | Construct a C++ program to perform stack operation using array | CO4 | Apply |
| 9 | Develop a C++ application to perform insertion sort, quick sort and merge sort. | CO5 | Apply |
| 10. | Write a C++ programs to implement recursive and non recursive i) Linear search ii) Binary search | CO5 | Apply |

**TOTAL: 30 Periods**

## Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

| COs | PO's | | | | | | | | | | | | PSO's | | |
|------|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO 1 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 2 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 3 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 5 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |
| CO 6 | 3 | 3 | 3 | 2 | 3 | | | | | | | 3 | 3 | 3 | 3 |

| 3-High | 2-Medium | 1- Low |
|--------|----------|--------|

## Assessment based on Continuous and Final Examination

| Bloom's Level | Continuous Assessment [50 marks] (Attendance-5 marks) | | Final Examination [40 marks] |
|---------------|-----------------------------------|-----------------------------|------------------------------|
| | Rubrics Continuous Assessment [40 marks] | Model Examination [20 Marks] | |
| Remember | | | |
| Understand | 40 | 40 | 40 |
| Apply | 60 | 60 | 60 |
| Analyze | | | |
| Evaluate | | | |
| Create | | | |

Passed in Board of Studies

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Approved in Academic Council

| **23MC203** | **INTERPERSONAL SKILLS**<br>(Common to all B.E. / B.Tech Programme) | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **0** | **0** | **2** | **0** |
| **Nature of Course** | Mandatory – Non Credit | | | | |
| **Pre requisites** | Nil | | | | |

## Course Objectives

### The course is intended to

1. Evaluate current relationships and their communication style.
2. Identify ways for improving important relationships.
3. Explore how the Bible correlates with principles from the chapter.
4. Describe how the communication processes impacts our ability to effectively communicate.
5. Identify challenges that may arise from interpersonal communication.
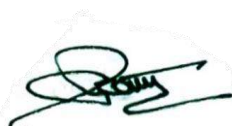
## Course Outcomes

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Practice interpersonal communication skills to influence and build good relationships. | Remember |
| CO 2 | Identify and pursue personal learning goals. | Understand |
| CO 3 | Give evident feedback. | Apply |
| CO 4 | Reveal group dynamics and amiable behaviour. | Apply |
| CO 5 | Emphasis the communication process. | Understand |

## Course Contents

| **Module – I** | **FUNDAMENTALS OF INTERPERSONAL COMMUICATION** | **6** |
|---|---|---|
| Facts of communication and Interpersonal communication - culture and gender - Communication and Self disclosure - Presentation of Interpersonal perception - Learning goals - Feeling and feedback. | | |
| **Module – II** | **INTERPERSONAL COMMUNICATION IN ACTION** | 6 |
| Nature of language - language and culture - usage and abuse of language -Positive communication -Non verbal communication - Listening strategies - Barriers of listening. | | |
| **Module – III** | **EMOTIONAL INTELLIGENCE** | 6 |
| Influence of emotional experience and expressions - Accepting the responsibilities and changes - Negotiation tactics - Dealing with criticism and appreciation - Collaborative Problem Solving - Resilience Building. | | |
| **Module – IV** | **TRANSACTIONS** | 6 |
| Different types of transactions - Building Positive Relationship - Managing Conflict - Connecting across Difference -Factors hampering Interpersonal interactions - Assertiveness in communication. | | |

| Module – V | ESSENTIAL INTERPERSONAL COMPETENCIES | 6 |
|---|---|---|
| | Behaviour - understanding limiting behaviour - Interpersonal and small and lateral thinking-Win -Win attitude - Positive thinking - Stress feedback - Personal Evaluation of Interpersonal Relationship Skills group behavior - Critical management - Assertive | |

**Total : 30 Periods**

## Text Books

1. Bozeman, Jeanine C and Argile Smith, "Interpersonal Relationship Skills for Ministers" Gretna, LA: Pelican Publishing Company, 1st Edition, 2004.
2. Floyd, Kory, "Interpersonal Communication", 2d. Boston: Mccraw-Hill, 2nd Edition, 2011.
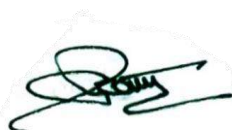
## Reference Books

1. Augsburger, David, "Caring Enough to Confront How to Understand and Express Your Deepest Feelings Towards Others", updated ed Ventura, CA: Regal Books, 2nd Edition 2009.

2. Vohs, Kathleen D., and Eli J., Finkel, eds, "Self and Relationships: Connecting Intrapersonal and interpersonal Processes". New York Guilford Press, 1st Edition, 2006.

## Web References:

1. https://nptel.ac.in/courses/111104031
2. https://nptel.ac.in/courses/111106139
3. https://nptel.ac.in/courses/111105134

## Laboratory Components:

| S.No | List of Experiments | CO Mapping | RBT |
|---|---|---|---|
| 1 | Presentation of Interpersonal perception | 1 | Remember |
| 2 | Non-Verbal Communication | 2 | Understand |
| 3 | Negotiation tactics | 3 | Apply |
| 4 | Managing Conflict | 4 | Apply |
| 5 | Stress Management | 5 | Understand |

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Pos** | | | | | | | | | | | | **PSOs** | |
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** |
| **CO 1** | | | | | | | | | | 3 | 2 | 1 | 2 | |
| **CO 2** | | | | | | | | | | 3 | 2 | 1 | 2 | |
| **CO 3** | | | | | | | | | | 3 | 2 | 1 | 2 | |
| **CO 4** | | | | | | | | | | 3 | 2 | 1 | 2 | |
| **CO 5** | | | | | | | | | | 3 | 2 | 1 | 2 | |
| | **3-High** | | | | **2-Medium** | | | | **1-Low** | | | | | |

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---|---|---|
| | **Assessment 1 (50 Marks)** | **Assessment 2 (50 Marks)** |
| Remember | 20 | 20 |
| Understand | 10 | 10 |
| Apply | 20 | 20 |
| Analyse | | |
| Evaluate | | |
| Create | | |

| 23MA401 | NUMERICAL METHODS (Common to AIDS ,BME, CSBS, CSE, ECE, EEE, IT and  M.Tech CSE) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Nature of Course | Basic Sciences |
|---|---|
| Pre requisites | Foundations of Mathematics |

## Course Objectives

The course is intended to

1. Introduce the basic concepts of algebraic and transcendental equations.
2. Indicate the Numerical techniques of interpolation in various intervals.
3. Learn the concept of numerical techniques of differentiation and integration.
4. Study the numerical techniques in solving ordinary differential equations.
5. Provide the Numerical techniques in solving one dimensional and two dimensional heat equations.
6. Acquire proficiency in employing computational techniques to solve mathematical problems efficiently and accurately.

## Course Outcomes

On successful completion of the course, students will be able to

| Co. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Demonstrate the algebraic and transcendental equations. | Apply |
| CO2 | Perform the numerical techniques of interpolation and error approximations in various Intervals. | Apply |
| CO3 | Compute the numerical techniques of differentiation and integration for engineering problems. | Apply |
| CO4 | Classify the numerical techniques for solving first order ordinary differential equations. | Apply |
| CO5 | Illustrate the solution of boundary value problems. | Apply |
| CO6 | Utilize computational techniques to solve mathematical problems efficiently and accurately. | Apply |

## Course Contents:

| Module – I | SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS | 9 |
|---|---|---|

Solution of Algebraic and Transcendental equations – Newton - Raphson method- Solution of linear system of equations -Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi method and Gauss Seidel method.

| Module – II | INTERPOLATION AND APPROXIMATION | 9 |
|---|---|---|

Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation – Interpolation with equal intervals – Newton's interpolation formulae.

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| Module – III | NUMERICAL DIFFERENTIATION AND INTEGRATION | 9 |
|---|---|---|

Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal and Simpson's 1/3 rules – Two point and three point Gaussian quadrature formulae.

| Module – IV | NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS | 9 |
|---|---|---|

Single step methods: Euler's method – Fourth order Runge - Kutta method for solving first order equations – Shooting Method – Multi step methods: Milne's predictor corrector methods for solving first order equations.

| Module – V | BOUNDARY VALUE PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS | 9 |
|---|---|---|

Finite difference techniques for the solution of two dimensional Laplace's equations on rectangular domain – One dimensional heat flow equation – Bender Schmidt method by explicit – Crank Nicholson methods.

**Total: 45 Periods**

### Text Books:

1. Grewal B.S, and Grewal J.S, " Numerical methods in engineering and science "Khanna Publishers, 10th Edition, 2015.
2. Burden, R.L. and Faires, J.D, "Numerical Analysis" Cengage Learning, 9th Edition, 2016.
3. Gupta, S.K., "Numerical Methods for Engineers", New Age Publishers, Third Edition, 2015.

### Reference Books:

1. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, New Delhi, 4th Edition, 2017.
2. Sastry, S.S., "Introductory Methods of Numerical Analysis", PHI Learning pvt Ltd, 5th Edition, 2015.
3. Jain, M.K., Iyengar, S.R.K. and Jain, R.K., "Computational Methods for Partial Differential Equations", New Age Publishers, 2016.
4. Curtis F.Gerald, Patrick.O. Wheatley, "Applied Numerical Analysis", Pearson Education, 8th Edition, 2022.

### Additional References:

1. https://nptel.ac.in/courses/111/107/111107105
2. https:/nptel.ac.in/courses/127/106/127106019
3. https://archive.nptel.ac.in/content/storage2/courses/122104018/node126.html

### Laboratory Components using MATLAB:

| S.No | List of Excercises | CO Mapping | RBT |
|---|---|---|---|
| 1 | Gauss Elimination Method | 1 | Apply |
| 2 | Gauss Seidel Method | 1 | Apply |
| 3 | Lagrange's Interpolation Formula | 2 | Apply |

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| 4 | Newton's Forward and Backward difference formula | 2 | Apply |
|---|---|---|---|
| 5 | Trapezoidal Rule | 3 | Apply |
| 6 | Simpson's 1/3 rd rule | 3 | Apply |
| 7 | Euler's Method | 4 | Apply |
| 8 | Runge – Kutta Method | 4 | Apply |
| 9 | Finite Difference Method | 5 | Apply |
| 10 | Bender Schmidt method | 5 | Apply |

Total: 30 Periods

### Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

| COs | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | | 2 | | |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | | 2 | | |
| CO3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | | 2 | | |
| CO4 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | | 1 | | |
| CO5 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | | 2 | | |
| CO6 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | | 2 | | |
| | 3 | High | | | 2 | Medium | | | | 1 | Low | | | | |

| Bloom's Level | Summative Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| | Continuous Assessment | | | | | | Final Examination (Theory) [50] |
| | Theory | | | | Practical | | |
| | IAE I (5) | IAE II (10) | IAE III (10) | Attendance [5] | Rubric based [10] | Model Exam [10] | |
| Remember | 10 | 10 | 10 | | | | 10 |
| Understand | 10 | 10 | 10 | | 40 | 40 | 30 |
| Apply | 30 | 30 | 30 | | 60 | 60 | 60 |
| Analyze | | | | | | | |
| Evaluate | | | | | | | |
| Create | | | | | | | |

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| 23EC401 | LINEAR INTEGRATED CIRCUITS | L | T | P | C |
|---------|----------------------------|---|---|---|---|
|         |                            | 3 | 0 | 0 | 3 |

| Nature of Course | Professional Core (PC) |
|------------------|------------------------|
| Pre requisites   | Analog Electronics     |

## Course Objectives

The course is intended to

1. Be familiar with the basic building blocks of linear integrated circuits
2. Learn the linear and non-linear circuits of operational amplifiers
3. Learn the theory of ADC and DAC in Real time Systems
4. Explore the theory and applications Active Filters and regulators
5. Interpret the knowledge of special function ICs

## Course Outcomes

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|-------|----------------|---------------|
| CO 1 | Infer the Op-Amp circuit and parameters including CMRR, PSRR, Input & output impedances and slew rate. | Understand |
| CO 2 | Examine Op-Amp applications as Summing, Difference Amplifier, and AC Amplifiers Voltage Follower. | Apply |
| CO 3 | Interpret ADC and DAC using Op-Amp. | Understand |
| CO 4 | Construct first order low, High pass filters and Rectifiers using Op-Amp. | Apply |
| CO 5 | Discuss the special function ICs. | Understand |
| CO 6 | Analyze the Integrated circuits using Op-Amp. | Analyze |

## Course Contents

| Module – I | Basics of operational amplifiers | 9 |
|------------|----------------------------------|---|

Basic Op-amp circuit, Op-Amp parameters – Ideal and Practical Op-Amp, DC and AC Characteristics Input and output voltage, CMRR and PSRR, offset voltages and currents, Input and output impedances, Slew rate and Frequency Compensation, Ideal Inverting and Non Inverting amplifier.

| Module – II | Applications Op-Amp | 9 |
|-------------|---------------------|---|

Adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, Active filters, peak detector, clipper and clamper.

| Module – III | Analog To Digital And Digital To Analog Converters | 9 |
|--------------|----------------------------------------------------|---|

Analog and Digital Data Conversions, weighted resistor type, Successive approximation type, R-2R Ladder type, Inverted R-2r ladder type, A/D Converter using Voltage-to-Time Conversion

| Module – IV | Rectifier, Active Filters And Regulators | 9 |
|-------------|------------------------------------------|---|

First order active Low-pass and high pass filters, Band pass Filter, Band stop Filter, Rectifiers-Half wave rectifiers-Full wave Rectifiers- Introduction, Series Op-amp regulator, IC voltage regulators, 723 general purpose regulators.

| Module – V | Special Function Ic's | 9 |
|------------|-----------------------|---|

Timer IC 555, Voltage Controlled Oscillator IC; 565-Phase Locked Loop IC, AD633 Analog multiplier ICs, switching regulator- SMPS – ICL 8038 function generator IC-Application-Codec ICs-UART ICs-Security ICs,3 Dimensional IC's.

**Total : 45 Periods**

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**CHAIRMAN-BOARD OF STUDIES**

**Text Books**

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd.,third edition, 2021.
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", third Edition, Tata Mc Graw-Hill, 2017.

**Reference Books**

1. Ramakant A. Gayakwad, "OP-AMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2021.
2. Robert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth Edition, PHI, 2000.

**Additional References**

1. https://www.udemy.com/course/linear-integrated-circuits-and-applications-for-all-levels/?couponCode=ST2MT43024
2. **NPTEL** - https://onlinecourses.nptel.ac.in/noc24_ee73

## Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

| COs | PO's | | | | | | | | | | | | PSO's | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO 1 | 3 | 2 | 2 | 1 | | | | | | | | 3 | 3 | 2 | 2 |
| CO 2 | 3 | 2 | 1 | 1 | | | | | | | | 3 | 3 | 2 | 2 |
| CO 3 | 3 | 2 | 1 | 1 | | | | | | | | 3 | 3 | 2 | 2 |
| CO 4 | 3 | 2 | 1 | 1 | | | | | | | | 3 | 3 | 2 | 1 |
| CO 5 | 3 | 2 | 1 | 1 | | | | | | | | 3 | 3 | 2 | 2 |
| | 3-High | | | 2-Medium | | | | 2- Low | | | | | | | |

### Formative Assessment

| Blooms Taxonomy | Assessment Component | Marks | Total marks |
|-----------------|---------------------|-------|-------------|
| Remember | Quiz | 5 | |
| Understand | Tutorial class / Assignment | 5 | 15 |
| Apply | | | |
| | Attendance | 5 | |

### Summative Assessment

| Bloom's Category | Internal Assessment Examinations (IAE) (40) | | | Final Examinations (FE) (60) |
|------------------|------------|-------------|--------------|------|
| | IAE – I (5) | IAE – II (10) | IAE – III (10) | |
| Remember | 20 | 10 | 10 | 10 |
| Understand | 30 | 20 | 20 | 60 |
| Apply | | 20 | 10 | 20 |
| Analyse | | | 10 | 10 |
| Evaluate | | | | |
| Create | | | | |

*Passed in Board of Studies*

*Approved in Academic Council*

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| 23EE408 | CONTROL SYSTEMS ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| Nature of Course | Professional Core | | | | |
| Prerequisites | Nil | | | | |

## Course Objectives

The course is intended to

1. Understand the concept of transfer function by using electrical, mechanical and other physical systems.
2. Analyze the time response of control systems and steady state error.
3. Understand the frequency responses of control systems.
4. Identify the systems stability.
5. Make use of the various approaches for the state variable analysis.
6. Elaborate the concepts of digital control systems and its applications.

## Course Outcomes

On successful completion of the course, students will be able to

| CO | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Compute the transfer function of a given system using mathematical models. | Apply |
| CO2 | Examine the time response of systems and analyze the steady state error. | Apply |
| CO3 | Employ the frequency domain specifications using frequency response plots. | Apply |
| CO4 | Determine and analyze the stability of given system. | Apply |
| CO5 | Manipulate various transfer functions of digital control system using state variable models. | Apply |

## Course Contents

| Module –I | Introduction to Control Problem | 09 |
|---|---|---|

Basic Industrial Control examples. Mathematical models of physical systems. Control hardware and their models. Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra – Signal Flow Graph-Mason's Gain Formula.

| Module –II | Time - Response Analysis | 09 |
|---|---|---|

Typical Time Response - Standard Test Signals - Type and Order of Control System - Time Response of First Order System for Unit Step - Unit Ramp and Impulse Input - Time Response of Second Order System for Unit Step Input -Time Domain Specifications.

| Module–III | Frequency - Response Analysis | 09 |
|---|---|---|

Speed Relationship between time and frequency response - Frequency Response -Frequency Domain Specifications -Resonant Peak -Resonant Frequency -Bandwidth-Cut-Off Rate -Gain Margin and Phase Margin -Frequency Response Plots -Polar Plot  Bode Plot.

| Module–IV | Stability Analysis | 09 |
|---|---|---|

The Concepts of Stability -Necessary Conditions for Stability -Relative Stability -Routh Hurwitz Stability Criterion -Root Locus -Effect of Addition of Poles -Effect of Addition of Zeros.

| Module–V | Control System Analysis using State Variable Methods | 09 |
|---|---|---|

*Passed in Board of Studies Meeting*

Approved in Academic Council Meeting

**CHAIRMAN-BOARD OF STUDIES**

Digital t State variable representation - Conversion of state variable models and transfer functions – Solution of state equations – Concepts of Controllability and Observability -Stability of linear systems

**Total: 45 Periods**

**Text Books:**

1. A.Nagoor kani, "Control Systems Engineering", RBA Publications, Third Edition, 2017.
2. I.J.Nagrath and M.Gopal, "Control Systems Engineering", New Age International (P) Ltd, Publishers, Sixth Edition, 2017.

**Reference Books:**

1. M.Gopal,"ControlSystems, Principles and Design", Tata Mc Graw Hill, Fourth Edition,2014.
2. Samarajit Gosh, "Control Systems Theory and Applications", Pearson publications, Second Edition, 2017.
3. S.Palani, "Control Systems Engineering", Tata McGraw Hill, Third Edition, 2015.

**Additional References:**

1. https://nptel.ac.in/courses/108/102/108102043/
2. www.classcentral.com/tag/control-systems

## MappingofCourseOutcomes(COs)withProgramOutcomes(POs)ProgramSpecific Outcomes(PSOs)

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 1 | 1 |
| CO2 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 1 | 1 | 1 |
| CO3 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 1 | 1 | - |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 1 | - |
| CO5 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 1 | 1 | - |
| | 3 | High | | | - | | | - | | | | 3 | Low | | |

## Formative assessment

| Bloom's Level | Assessment Component | Marks | Total marks |
|---------------|----------------------|-------|-------------|
| Remember | Online Quiz | 5 | |
| Understand | Tutorial Class/Assignment | 5 | 15 |
| | Attendance | 5 | |

## Summative Assessment

| Bloom's Category | Internal Assessment Examinations | | | Final Examination (60) |
|------------------|------------|-------------|--------------|------------------------|
| | IAEI (5) | IAEII (10) | IAE III (10) | |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 30 | 30 | 30 | 60 |
| Analyze | - | - | - | - |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

| 23EC402 | ELECTROMAGNETIC FIELDS | L | T | P | C |
|---------|------------------------|---|---|---|---|
|         |                        | 3 | 0 | 0 | 3 |

| Nature of Course | Professional Core |
|------------------|-------------------|
| Pre requisites   | Electronic Devices and Circuits |

## Course Objectives

The course is intended to

1. Be familiar with some elementary phenomena and basic concepts in field theory.
2. Acquire knowledge about theorems and laws of static magnetic field.
3. Learn the characteristics of electric and magnetic fields in conductors, dielectrics and magnetic materials.
4. Gain knowledge about the Time-varying fields and Maxwell's equations.
5. Study about the Electromagnetic Waves Interference (EMI) and suppression methods of EMI.

## Course Outcomes

On successful completion of the course the students will be able to

| CO No. | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO 1 | Explain Laws, Concepts and proofs of Electrostatic Fields. | Understand |
| CO 2 | Determine the static magnetic field, force and torque due to conducting elements. | Understand |
| CO 3 | Compare the characteristics of electric and magnetic fields in conductors, dielectrics and magnetic materials. | Understand |
| CO 4 | Analyze the electromagnetic wave propagation using Maxwell's equations. | Analyze |
| CO 5 | Interpret concepts and the suppression methods of EMI. | Understand |
| CO 6 | Analyze magnetic fields in different materials and media | Analyze |

## Course Contents

| MODULE – I | Electrostatics | 9 |
|------------|----------------|---|

Review of Vector algebra--Vector field-Dot and cross product- Rectangular, cylindrical and spherical coordinate systems-Experimental law of Coulomb and Electric field intensity, Electric flux density, Application of Gauss law to point charge, line charge and Surface charge - Divergence theorem-Electrostatic Potential, Potential Gradient.

| MODULE – II | Magneto statics | 9 |
|-------------|-----------------|---|

Scalar and vector magnetic potential -Biot-Savart law and applications-Ampere's circuit law and applications-Curl and Stokes' theorem- Magnetic flux and magnetic flux density- Magnetic energy, Magnetic forces and torques- Ampere's Force Law-Lorentz force equation.

| MODULE– III | Electric And Magnetic Fields In Materials And Boundary Conditions | 9 |
|-------------|------------------------------------------------------------------|---|

Electric field inside a dielectric material -Boundary Conditions - Boundary conditions for electric fields- Poisson's and Laplace's equation- Capacitance of various geometries using Laplace equation - Capacitance of parallel plates spherical coaxial capacitors Boundary conditions for Magnetic fields –Inductance- -Mutual inductance-simple examples.

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| MODULE– IV | Time Varying Fields And Maxwell Equations | 9 |
|---|---|---|
| Faraday's law- Self and Mutual Inductance- Displacement current Density -Maxell's equations in point form and integral form- Relation between field theory and circuit theory - Poynting's theorem and Poynting Vector -Significance . | | |
| MODULE – V | Electromagnetic waves and Interference | 9 |
| Electromagnetic wave generation and equations–Uniform plane waves-Maxwell's equation in phasor form-Waves in free space, lossy and lossless dielectrics. Introduction to Electro Magnetic Interference (EMI)-Noise source in Electro magnetics-Methods to suppress EMI. | | |

**Total : 45 Periods**

## Text Books

1. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2020.
2. E.C.Jordan & K.G.Balmain,"Electromagnetic Waves and Radiating Systems", Pearson Education, Second edition, 2015.

## Reference Books

1. Mathew.N.O. Sadiku, "Elements of Electromagnetic", Oxford University Press, Seventh Edition,2018.
2. Gangadhar, K.A, Field Theory, Khanna Publishers, New Delhi, Sixteenth Edition, 2020.
3. DJoseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2018.

## Additional References

1. https://www.digimat.in/nptel/courses/video/108104087/L01.html
2. https://www.youtube.com/watch?v=eLOutoWoDNg

| | Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **PO's** | | | | | | | | | | | | | **PSO's** | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO 1 | 3 | 3 | 1 | | | | 2 | | | | | | 3 | 2 | 2 |
| CO 2 | 3 | 3 | 1 | | | | 2 | | | | | | 3 | 2 | 2 |
| CO 3 | 3 | 3 | 1 | | | | 2 | | | | | | 3 | 2 | 2 |
| CO 4 | 3 | 3 | 1 | | | | 2 | | | | | | 3 | 2 | 2 |
| CO 5 | 3 | 3 | 1 | | | | 2 | | | | | | 3 | 2 | 2 |
| CO 6 | 3 | 3 | 1 | | | | 2 | | | | | | 3 | 2 | 2 |
| | 3-High | | | 2-Medium | | | 3- Low | | | | | | | | | |

## Formative Assessment

| Blooms Taxonomy | Assessment Component | Marks | Total marks |
|---|---|---|---|
| Remember | Classroom/ Online Quiz /Group Discussion | 5 | |
| Understand | Assignment | 5 | 15 |
| | Attendance | 5 | |

## Summative Assessment

| Bloom's Category | Internal Assessment Examinations (IAE) (40) | | | Final Examinations (FE) |
|---|---|---|---|---|
| | IAE – I (5) | IAE – II (10) | IAE – III (10) | (60) |
| Remember | 20 | 10 | 10 | 10 |
| Understand | 30 | 20 | 20 | 60 |
| Apply | | 10 | 10 | 20 |
| Analyse | | 10 | 10 | 10 |
| Evaluate | | | | |
| Create | | | | |

Passed in Board of Studies

Approved in Academic Council

**CHAIRMAN-BOARD OF STUDIES**

| 23EC403 | MICROPROCESSOR AND MICROCONTROLLER | L | T | P | C |
|---------|-----------------------------------|---|---|---|---|
|         |                                   | 3 | 0 | 2 | 4 |

| Nature of Course | Professional Core |
|------------------|-------------------|
| Pre requisites | Digital Electronics. |

### Course objectives:
The course is intended to
1. Learn the concepts of 8086 Architecture and multiprocessor configuration.
2. Examine the various interfacing peripheral devices to microprocessor.
3. Study the functionality of 8051 Microcontroller.
4. Expose the functionality of ARM Processor.
5. Provide the hands on training in arduino usage and its applications.

### Course Outcomes:
On successful completion of the course, students will be able to

| CO.No. | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO1 | Describe the basic concept of architecture and assembly language program using 8086 processor. | Understand |
| CO2 | Examine the concept of peripheral Interfacing with 8086. | Understand |
| CO3 | Discuss the basic operations and interrupts using 8051. | Understand |
| CO4 | Analyze the concept of ARM Architecture. | Analyze |
| CO5 | Illustrate the ATmega328P Microcontroller architecture. | Understand |
| CO6 | Develop project for different application using advanced microcontrollers | Apply |

### Course Contents:

| MODULE – I | 16 Bit Microprocessor | 9 |
|------------|----------------------|---|

Architecture of 8086 –Pin diagram of 8086- Addressing modes of 8086– Instruction Set of 8086 - Minimum mode configuration -Maximum mode configuration-Coprocessor, Closely coupled and Loosely Coupled Multiprocessor configurations.

| MODULE – II | Peripherals and interfacing | 9 |
|-------------|----------------------------|---|

I/O interfacing – Programmable peripheral interface (8255)–Programmable Timer/controller (8253) –Keyboard /display controller (8279) – Serial communication interface (8251) – D/A and A/D Interface–Programmable Interrupt controller (8259).

| MODULE– III | 8051 Microcontroller | 9 |
|-------------|---------------------|---|

Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports- Timers – Interrupts – Serial communication - Instruction set - Addressing modes - Assembly language programming. Case study –Stepper motor & traffic light control using 8051.

| MODULE– IV | ARM Processor | 9 |
|------------|---------------|---|

Introduction to ARM Processor-ARM Processor–Processor Families – Features of ARM - ARM7 TDMI Architecture – Programmer's Model – Interrupts and Exceptions- Operating Modes– Addressing Modes – ARM Instruction Set.

| MODULE – V | ARDUINO MICROCONTROLLER | 9 |
|------------|------------------------|---|

ATmega328P microcontroller Pin configuration and architecture - Concept of digital and analog ports- Serial Communication with Arduino - Basics of Embedded C programming for Arduino- Interfacing of Led, Switch, Temperature, Motion, Light and Gas Sensor with Arduino-Interfacing of Relay Switch and Servo Motor with Arduino.

Total : 45 Periods

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## Laboratory Components

| S.No | List of Experiments | CO Mapping | RBT |
|------|---------------------|------------|-----|
| 1 | Write the assembly language program for the basic arithmetic and logical operations for 8086 microprocessors | CO1 | Apply |
| 2 | Write the assembly language program for Code conversion, and Matrix operations for 8086. | CO1 | Apply |
| 3 | Write the assembly language program of Programmable Peripheral Interface of 8086. | CO1 | Apply |
| 4 | Write the assembly language program for the Stepper motor interfacing of 8086. | CO1 | Apply |
| 5 | Write the assembly language program for the Key board and Display interfacing of 8086. | CO3 | Apply |
| 6 | Write the assembly language program for the basic arithmetic and Logical operations of 8051. | CO3 | Apply |
| 7 | Write the embedded C program for the serial communication. | CO4 | Apply |
| 8. | Interfacing with Sensors and Actuators using LED and switch Interfacing with Arduino | CO5 | Apply |
| 9 | Interfacing with Sensors and Actuators using Motion Sensor Interfacing and Light Sensor Interfacing with Arduino. | CO5 | Apply |
| 10. | Interfacing with Sensors and Actuators using Gas Sensor Interfacing and Servo Motor Interfacing with Arduino. | CO5 | Apply |

**Total: 30 Periods**

**Text Books :**
1. A.K.Ray and K.M.Bhurchandi, "Advanced Microprocessors and Peripherals ",MC Graw Hill Education, Third Edition ,2021.
2.. Mohammed Ali Mazidi and Janice GillispieMazidi, "The 8051 Microcontroller and Embedded Systems using Assembly and C", Pearson Education, Second Edition 2018.

**References :**
1. Krishna Kant, "Microprocessors and Microcontrollers", Eastern Economy Edition, PHI Learning Private Limited, 2018.
2. DoughlasV.Hall, Microprocessors and Interfacing, Programming and Hardware, 2017.
3.Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems", The 8086 / 8088 Family - Architecture, Programming and Design, Second Edition, Prentice Hall of India, 2015.

**Additional References:**
- **NPTEL:** https://nptel.ac.in/courses/117/104/117104072/
- https://www.classcentral.com/course/swayam-microprocessors-and-microcontrollers-9894

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## Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 | 2 | | | | | | | | | | 2 | 2 | 2 |
| CO2 | 3 | 2 | 2 | | | | | | | | | | 1 | 2 | 2 |
| CO3 | 2 | 3 | 3 | | | | | | | | | | 1 | 3 | 3 |
| CO4 | 2 | 2 | 2 | | | | | | | | | | 1 | 2 | 2 |
| CO5 | 2 | 2 | 2 | | | | | | | | | | 2 | 2 | 2 |
| CO6 | 2 | 2 | 2 | | | | | | | | | | 2 | 2 | 2 |
| | 3 | | High | | | 2 | | | Medium | | | 1 | | Low | |

| Bloom's Level | Summative Assessment | | | | | Final Examinations (Theory) (50) |
|---------------|---|---|---|---|---|---|
| | Continuous Assessment Tests | | | | | |
| | Theory | | | | Practical's (20) | |
| | IAE I (5 | IAE II (10) | IAE III (10) | Attendance (5) | | |
| Remember | 10 | 10 | 10 | | 20 | 20 |
| Understand | 20 | 20 | 20 | | 10 | 60 |
| Apply | 10 | 10 | 10 | | 10 | 10 |
| Analyze | 10 | 10 | 10 | | 10 | 10 |
| Evaluate | | | | | | |
| Create | | | | | | |

| 23CS404 | JAVA PROGRAMMING | L | T | P | C |
|---------|------------------|---|---|---|---|
|         |                  | 3 | 0 | 2 | 4 |

| Nature of Course | Engineering Sciences |
|------------------|----------------------|
| Pre requisites   | NIL                  |

## Course Objectives

The course is intended to

1. Teach principles of object oriented programming paradigm..
2. Impart fundamentals of Java, including defining classes, Invoking methods, using class libraries, etc.
3. Learn how to design and program stand-alone Java applications.

## Course Outcomes

On successful completion of the course, students will be able to

| CO.No. | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO1. | Understand the concept of OOPs and fundamentals of java. | Understand |
| CO2. | Design an object oriented system using java as per needs and specifications. | Apply |
| CO3. | Design and develop java programs using inheritance, polymorphism, packages and interfaces. | Apply |
| CO4. | Apply exception handling and multithreading for developing efficient programs. | Apply |
| CO5. | Design and program stand-alone Java applications using AWT controls. | Apply |
| CO6 | Develop stand-alone Java applications using Swing components. | Apply |

## Course Contents

### MODULE - I INTRODUCTION                                          9

Object Oriented Programming concepts - History and Features of Java - Data types – Variables – Arrays – Operators - Control statements - Type conversion - Structure of java program – Class – Object – Method – Constructor - Static block - Static Data Member - Static Method – String - String Buffer Class.

### MODULE - II    INHERITANCE AND POLYMORPHISM                      9

Types of Inheritance - Member Access rules - Usage of this and Super keyword - Method Overloading - Method Overriding - Abstract class - Final keyword - Packages - Defining and Importing Package - Interface - Streams.

### MODULE - III    EXCEPTION HANDLING AND MUTLITHREADING            9

Exception Type - Try, Catch, Throw, Throws and Finally - Built-in Exceptions - User defined exception handling – Multithreading – Concepts - Thread life cycle - Creating thread - Using Thread class - Using Runnable interface – Synchronization - Thread priorities - Inter-thread communication.

### MODULE - IV    AWT CONTROLS                                       9

AWT class hierarchy - User interface component - Labels, Button - Text Components - Check Box - Check Box Group - Choice, List Box - Panels Scroll Pane – Menu - Scroll Bar - Working with Frame class – Colour - Fonts and layout managers - Java Event classes and Listener interfaces.

### MODULE - V    SWING                                               9

Introduction – Class - Hierarchy of swing components – Containers - Top level containers – Jframe – Jwindow – Jdialog – Jpanel – Jbutton – JtoggleButton – JcheckBox – JradioButton – Jlabel – JtextField – JtextArea – Jlist – JcomboBox - JScrollPane.

**Total: 45 Periods**

**Laboratory Components:**

| S.No | List of experiments | CO Mapping | RBT |
|------|---------------------|------------|-----|
| 1. | Write a java program to display the employee details using Scanner class. | CO1 | Apply |
| 2. | Write a java program for Method overloading and Constructor overloading. | CO2 | Apply |
| 3. | Write a java program to create user defined package. | CO2 | Apply |
| 4. | Write a java program for creating multiple catch blocks. | CO3 | Apply |
| 5. | Write a Java program that implements a multi-thread application that has three threads. | CO3 | Apply |
| 6. | Write a java program for developing simple application using AWT controls. | CO4 | Apply |
| 7. | Write a java program for developing simple application using Swing. | CO5 | Apply |

**Text Books**
1. Herbert schildt "The complete reference" Tata Mc Graw Hill, New Delhi 12th edition 2022.
2. T.Budd "An Introduction to Object Oriented Programming". Pearson Education, India 5th Edition 2020.

**Reference Books**
1. Y. Daniel Liang "Introduction to Java programming and Data Structures", Pearson Education, Pearson education 13th edition 2024.
2. E Balagurusamy "Programming with Java", Tata McGraw Hill, Pearson education 7th edition 2023.
3. J. Nino, F. A. Hosch "An Introduction to programming and OO design using Java" John Wiley & sons, New Jersey, 2009.

**Additional References:**
1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview
2. https://www.iitk.ac.in/esc101/08Jul/notes.html
3. https://www.javatpoint.com/java-tutorial

CHAIRMAN - BOARD OF STUDIES

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| 23EC404 | LINEAR INTEGRATED CIRCUITS LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

| Nature of Course | Professional Core |
|---|---|
| Pre requisites | Engineering practices lab ,Circuits and Devices Lab |

## Course Objectives:

The course is intended to
1. Gain hands on experience about linear integrated circuits.
2. Identify the linear and non linear applications of Op-amp
3. Learn the filter circuits using op-amp
4. Study the theory of ADC and DAC in real time Systems
5. Learn the P-SPICE software for circuit design.

## Course Outcomes:

| CO.No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Design linear integrated circuits using IC's | Apply |
| CO2 | Design and analyze the Linear applications of Op-amp. | Apply |
| CO3 | Demonstratethefiltercircuitsusingop-ampandperformexperimentonfrequencyresponse. | Apply |
| CO4 | Illustrate the performance and principles of Digital to analog converter | Apply |
| CO5 | Demonstrate the linear and non linear functions of Op-Amp | Apply |
| CO6 | Analyze the circuit using P-SPICE Software | Apply |

## Laboratory components

| .No. | List of Experiments | CO | RBT |
|---|---|---|---|
| 1. | Design an Inverting and Non-Inverting amplifier using Op- amp (IC741) . | CO1 | Apply |
| 2. | Design of Integrator and Differentiator using Op -amp (IC741) . | CO2 | Apply |
| 3. | Design a Differential amplifier using Op-amp (IC741) and identify CMRR. | CO2 | Apply |
| 4. | Design of Schmitt trigger using Op-amp(IC741). | CO2 | Apply |
| 5. | Design of Low pass, High pass and active notch filters using Op - amp(IC741). | CO3 | Apply |
| 6 | Design of Waveform generators and filter circuit using555Timer. | CO3 | Apply |
| 7 | Construct R-2RladderDACusingop-amp. | CO4 | Apply |
| 8 | Design of Astable and Monostable Multivibrator using IC741. | CO5 | Apply |
| 9 | Design of log and antilog amplifiers and obtain frequency response | CO5 | Apply |
| 10 | Simulate experiments using P-Spice tool for inverting amplifier and differential amplifier. | CO6 | Apply |

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**CHAIRMAN-BOARD OF STUDIES**

## Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)

| Cos | Pos | | | | | | | | | | | | PSOs | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 3 | 3 | | | | | | | | | | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | | | | | | | | | | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | | | | | | | | | | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | | | | | | | | | | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | | | | | | | | | | 3 | 3 | 3 |
| CO6 | 3 | 3 | 3 | | | | | | | | | | 3 | 3 | 3 |
| | 3 | | High | | | 2 | | | Medium | | | 1 | | Low | |

## Assessment based on Continuous and Final Examination

| Bloom's Level | Continuous Assessment [50 marks] (Attendance-5 marks) | | Final Examination [50 marks] |
|---|---|---|---|
| | Rubrics Continuous Assessment [25 marks] | Model Examination [20 Marks] | |
| Remember | 10 | 10 | 20 |
| Understand | 10 | 10 | 30 |
| Apply | 30 | 30 | 50 |
| Analyze | | | |
| Evaluate | | | |
| Create | | | |

Passed in Board of Studies                                    Approved in Academic Council

**CHAIRMAN-BOARD OF STUDIES**

| 23MC004 | INDIAN CONSTITUTION | L | T | P | C |
|---------|---------------------|---|---|---|---|
| | (Common to all B.E. / B.Tech Programme) | 2 | 0 | 0 | 0 |
| **Nature of Course** | Mandatory Course | | | | |
| **Pre requisites** | Fundamentals of Indian Constitution | | | | |

## Course Objectives

### The course is Intended to

1. Know about the basic structure with the key elements of the Indian Constitution.
2. Enable students to grasp the Fundamental Rights, Directive Principles of State Policy and Fundamental Duties of our constitution.
3. Promote the students about our Union Government, political structure and their functions.
4. Prepare the students with the Indian judiciary and Election systems.
5. Learn the State Legislature, State politics and State planning commission in India.
6. Study the powers and functions of various constitutional offices and institutions.

## Course Outcomes

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|-------|----------------|---------------|
| CO 1 | Utilize the basic structure of Indian Constitution in real life situation. | Understand |
| CO 2 | Relate their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. | Understand |
| CO 3 | Compare the Union Government, political structure and their powers and functions. | Understand |
| CO 4 | Outline about our Indian Judiciary, Election Commission and Amendments. | Understand |
| CO 5 | Summarize the power and functions of State Legislature. | Understand |
| CO 6 | Realise the significance of the constitution and appreciate the role of constitution and citizen oriented measures in a democracy. | Understand |

## Course Contents

| Module – I | INTRODUCTION TO INDIAN CONSTITUTION | 6 |
|------------|--------------------------------------|---|

The Historical background - Meaning of the term Indian Constitution - Necessity of the Constitution - Societies before and after the Constitution adoption - Introduction to the Indian constitution - Making of the Constitution, Role of the Constituent Assembly.

| Module – II | FUNDAMENTAL RIGHTS | 6 |
|-------------|--------------------|---|

Salient features of India Constitution - Preamble of Indian Constitution & Key concepts of the Preamble - Fundamental Rights (FR's) - its Restriction and limitations in different Complex Situations - Directive Principles of State Policy - its present relevance in Indian society - Fundamental Duties - its Scope and significance in Nation.

**CHAIRMAN-BOARD OF STUDIES**

| Module – III | UNION GOVERNMENT | 6 |
|---|---|---|

Union Government – Union legislature – Lok sabha – Rajya sabha (with powers and functions) -Union Executive – President (with powers and functions), Prime Minister (with powers and functions), Union Cabinet.

| Module – IV | INDIAN JUDICIARY AND ELECTION COMMISSION | 6 |
|---|---|---|

Structure of Judicial System in India - Supreme Court - High Courts - District Courts - Role of Judiciary in India - Judicial Reviews and Judicial Activism. Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today.

| Module – V | STATE LEGISLATURE | 6 |
|---|---|---|

Organization and Composition of State Legislature - Legislative Council - Composition of the Council - Composition of the Assembly - Qualifications for the Houses - Legislative Assembly - Duration of State Legislature - Duration of Assembly - Duration of Council.

**Total : 30 Periods**

## Text Books

1. Durga Das Basu, Introduction to the Constitution of India, Gurgaon; LexisNexis, (23rd edn.) 2018
2. J.N. Pandey, The Constitutional Law of India, Allahabad; Central Law Agency,(55th edn.) 2018.
3. P.M Bakshi, Constitution of India, Universal Law Publishing House, NewDelhi, 1999.

## Reference Books

1. Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. KB Merunandan, Bharatada Samvidhana Ondu Parichaya, Bangalore, Meragu Publications, 2015
3. K.Sharma, Introduction to the Constitution of India, Prentice Hall of India, NewDelhi, 2002.

## Web References:

1. https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf.
2. https://edukemy.com/blog/upsc-ncert-notes-indian-polity-state-legislature/#Organization _and_Composition_of_State_Legislature
3. https://blog.ipleaders.in/dpsp-and-fundamental-rights/

CHAIRMAN-BOARD OF STUDIES

## Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

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

| 3-High | 2-Medium | 1-Low | . |
|--------|----------|-------|---|

### Formative assessment

| Bloom's Level | Continuous Assessment (IAE) | | Total marks |
|---------------|---------------------------|-------|-------------|
|               | Assessment component | Marks | |
| Remember   | Online Quiz | 20 | |
| Understand | Tutorial class/Assignment | 25 | 50 |
|            | Attendance | 5 | |

### Summative assessment

| Bloom's Level | Continuous Assessment (IAE) | | |
|---------------|---------------------------|---|---|
|               | Theory Marks | | |
|               | IAE-I [10] | IAE-II [20] | IAE-III [20] |
| Remember   | 20 | 10 | 10 |
| Understand | 30 | 20 | 20 |
| Apply      |    | 20 | 20 |
| Analyse    |    |    |    |
| Evaluate   |    |    |    |
| Create     |    |    |    |

Rmr

**CHAIRMAN-BOARD OF STUDIES**

| 23MC005 | YOGA AND VALUES FOR HOLISTIC DEVELOPMENT (Common to all B.E. / B.Tech Programme) | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 |
| **Nature of Course** | Mandatory Course | | | | |
| **Pre requisites** | Fundamentals of Yoga | | | | |

## Course Objectives
### The course is intended to
1. Know the various types of yoga and their benefits.
2. Practice essential yoga postures and techniques.
3. Give mental clarity and focus through the practice of pranayama.
4. Incorporate relaxation technique into their daily routine works.
5. Use meditation to reduce stress and anxiety.
6. Promote positive health, prevention of stress related health problems and rehabilitation through Yoga.

## Course Outcomes
On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Balance their full potential and confidence. | Understand |
| CO 2 | Understand the knowledge of fundamental yoga postures. | Understand |
| CO 3 | Realize the enhanced the functions of inner organs. | Understand |
| CO 4 | Achieve a deep state of relaxation and release physical and mental tension. | Understand |
| CO 5 | Cultivate a sense of calm and well-being. | Understand |
| CO 6 | Experience enhanced flexibility, strength and balance as well as reduced stress. | Understand |

## Course Contents

| Module – I | INTRODUCTION TO YOGA | 6 |
|---|---|---|

Foundations of Yoga - History and Development of Yoga - Etymology and Definitions, Misconceptions, Aim and Objectives of Yoga, True Nature and Principles of Yoga - Introduction to Vedas – Upanishads - Prasthanatrayee - Purushartha Chatushtaya.

| Module – II | POSTURES (ASANA) | 6 |
|---|---|---|

Trikonasana - Ardha-Kati – Chakrasana – Tadasana - Vrikshasana - Padmasana, Simhasana - Paschimottanasana, Uttanpadasana – Salabhasana - Shavasana Pawanmuktasana - Anti-Rheumatic Series - Digestive / Abdominal Group - Energy Bock Series - Back Strengthening Exercises - Sun Salutation (Surya Namaskar) - Classical Sequence.

| Module – III | BREATHING | 6 |
|---|---|---|

The Foundations - Abdominal Breathing - Thoracic (mid-chest) breathing - Clavicular (upper chest breathing) - The Complete Yoga Breath. Pranayama Techniques - Breathing Ratios - Nadi Shodhana (Alternate Nostril Breathing) - Ujjayi (the 'whispering breath' or the 'psychic breath') - Bhramari (Humming Bee breath).

| Module – IV | RELAXATION | 6 |
|---|---|---|

Quick Relaxation techniques - Tense & Relax - Short Yoga Nidra (Power Nap) - Extended Shavasana - Yoga Nidra – Sankalpa.

| Module – V | MEDITATION | 6 |
|---|---|---|

Develop a good, comfortable sitting posture - Kaya Sthairyam (Body Stillness) - Om Chanting - Trataka (Concentrated Gazing).

**Total : 30 Periods**

### Text Books

1. Stephen Sturges, The Yoga Book. Motilal Banarsidass, Delhi, 2004.
2. Singh S.P & Yogi, Foundation of Yoga, Standard Publication, New Mukesh Delhi, 2010.
3. Sahay G.S. HathaYoga Pradeepika of Svatmarama, MDNIY Publication, 2013.

### Reference Books

1. Bhat, Krishna K. The Power of Yoga: SuYoga Publications Mangalore,2006.
2. Fenerstein, George, The Yoga Tradition: It's History, Literature, Philosophy practice, Bhavana Books and Prints, 2002.
3. Tiwari, O.P, Asana Why and How? Kaivalyadhama, Lonavla, 2011.

### Web References:

1. https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf.
2. https://edukemy.com/blog/upsc-ncert-notes-indian-polity-state-legislature/#Organization_and_Composition_of_State_Legislature
3. https://blog.ipleaders.in/dpsp-and-fundamental-rights/

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---|---|---|
| | Assessment 1 (50 Marks) | Assessment 2 (50 Marks) |
| Remember | 10 | 10 |
| Understand | 10 | 10 |
| Apply | 30 | 30 |
| Analyze | | |
| Evaluate | | |
| Create | | |

**CHAIRMAN-BOARD OF STUDIES**

| 23MC006 | SOFT SKILLS | L | T | P | C |
|---|---|---|---|---|---|
| | (Common to all B.E. / B.Tech Programme) | 0 | 0 | 2 | 0 |
| **Nature of Course** | Mandatory Course | | | | |
| **Pre requisites** | Nil | | | | |

## Course Objectives

**The course is intended to**

1. Improve language skills in personal and professional life.
2. Equip students with the vital communication and soft skills to succeed in the highly competitive international arena.
3. Focus on the fundamental soft skills and of their practical social and work place usage.
4. Learn to identify and overcome the barriers in interpersonal relationships.
5. Enhance employability skills and ensure career success.

## Course Outcomes

On successful completion of the course the students will be able to

| CO.No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Relate the significance and fundamental nature of soft skills. | Remember |
| CO 2 | Take part in a wide range of Public speaking and professional group discussions. | Understand |
| CO 3 | Plan one's time effectively and productively, especially at work. | Apply |
| CO 4 | Make use of leadership skills to manage stress &conflict. | Apply |
| CO 5 | Organize presentation effectively and participate in interview with confidence. | Apply |

## Course Contents

| Module – I | INTRODUCTION TO SOFT SKILLS AND INTERPERSONAL COMMUNICATION | 6 |
|---|---|---|

An Introduction – Definition and Significance of Soft Skills; Interpersonal communication-types of interpersonal communication.

| Module – II | PUBLIC SPEAKING AND ORAL COMMUNICATION SKILLS | 6 |
|---|---|---|

Public Speaking: Skills, Methods, Strategies Group Discussion: Importance, Planning, Elements.

| Module – III | TIME MANAGEMENT AND PERSONALITY DEVELOPMENT | 6 |
|---|---|---|

Time Management – concepts and essentials tips. Personality-development – meaning, SWOT analysis & goal setting- Stress and conflict management.

| Module – IV | LEADERSHIP SKILLS AND EMOTIONAL INTELLIGENCE | 6 |
|---|---|---|

Leadership skills: Concept of Leadership and honing Leadership Skills- Problem-Solving Skills - Group and Ethical Decision-Making. Emotional Intelligence: Strategies to enhance Emotional Intelligence.

| Module – V | INTERVIEW SKILLS | 6 |
|---|---|---|
| Interviewer - Interviewee perspectives - Self Introduction and Presentation: Types, Content and Essential Tips–before, during and after a presentation, Overcoming Nervousness - Mock Interview. | | |

**Total : 30 Periods**

### Text Books

1. Managing Soft Skills for Personality Development–edited by B.N.Ghosh, McGraw Hill India, 2018.
2. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
3. English and Soft Skills–S.P. Dhanavel, Orient Black swan India, 2017.

### Reference Books

1. Soft Skill Business and Professional Communication Book by Sutapa Banerjee,2016.
2. Communication Skills Book by PushpLata and Sanjay Kumar,2015.
3. Klaus, Peggy, Jane Rohman & Molly Hamaker. The Hard Truth about Soft Skills. London: HarperCollins E-books, 2007.

### Web References:

1. https://nptel.ac.in/courses/109/107/109107121/
2. https://onlinecourses.nptel.ac.in/noc22_hs77/preview
3. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)

| COs | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | | | | | | | | 1 | 2 | 3 | | 2 | | | |
| CO2 | | | | | | | | 1 | 2 | 3 | | 2 | | | |
| CO3 | | | | | | | | 1 | 2 | 3 | | 2 | | | |
| CO4 | | | | | | | | 1 | 2 | 3 | | 2 | | | |
| CO5 | | | | | | | | 1 | 2 | 3 | | 2 | | | |
| | 3 | High | | | | 2 | | Medium | | | 1 | Low | | | |

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---|---|---|
| | Assessment 1 (50 Marks) | Assessment 2 (50 Marks) |
| Remember | 10 | 10 |
| Understand | 10 | 10 |
| Apply | 30 | 30 |
| Analyze | | |
| Evaluate | | |
| Create | | |

**CHAIRMAN-BOARD OF STUDIES**

| 20ECA01 | PCB Design Using Advanced Tools | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| Nature of course | Employability Enhancement Course | | | | |
| Pre requisites | Fundamentals of Electronics Engineering | | | | |

## Course Objectives
The course is intended to
1. Learn the concepts of designing PCB using advanced tools

## Course Outcomes
On successful completion of the course, students will be able to

| CO. No | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Implement circuits using schematic in PCB | Apply |
| CO 2 | Hands-on for understanding the process flow of PCB and its testing | Apply |

## Course Contents
### Unit I - Introduction to Printed Circuit Boards                                     8
PCB layout and stack up - General PCB layout Considerations, PCB to chassis ground connections, return path discontinuity, PCB layer stack up, General PCB design procedure, mixed signal PCB layout, Split planes, Ground connection and power distribution, vertical isolation - Near fields and far fields, characteristic and wave impedances, shielding effectiveness, absorption and reflection loss - Different Electronic design automation (EDA) tools and comparison.

### Unit II – Simulation and Layout                                                       7
Introduction to Altium ECAD software, project template, schematic design, familiarization of the schematic editor, schematic creation, annotation, net list generation, layout design, familiarization of footprint editor, mapping of components, creation of PCB layout schematic, create new schematic components, create new component footprints.

**Total Periods: 15**

| Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | POs | | | | | | | | | | | | PSOs | | |
| COs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 2 | 2 | 2 | | | | | | | | 2 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 2 | 2 | | | | | | | | 2 | 2 | 2 | 2 | 3 |
| | 3 | | High | | | 2 | | Medium | | | 1 | | Low | | |

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---|---|---|
| | Assessment 1 (50 Marks) | Assessment 2 (50 Marks) |
| Remember | | |
| Understand | 20 | 20 |
| Apply | 30 | 30 |
| Analyze | | |
| Evaluate | | |
| Create | | |

| 23ECA02 | Modeling of Digital System Using HDL | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| Nature of course | Employability Enhancement Course | | | | |
| Pre requisites | Digital Electronics | | | | |

## Course Objectives

1. Study the programming concepts and Test bench generation using VHDL
2. Exposure of functional simulation and verification of digital modules Using VHDL

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No | Course Outcome | Bloom's Level |
|---|---|---|
| CO1 | Translate the description of a functional system into an appropriate digital block coded in VHDL. | Understand |
| CO2 | Implement the digital systems using test benches in VHDL using Xilinx ISE. | Apply |

## Course Contents

### Unit I – VHDL Programming
7

Introduction - Programming structure: Entity – Architecture - VHDL Data types - Operators in the Standard Numeric Library - Combinational Circuit design using VHDL - VHDL Processes - Sequential Statements - Decision and Loop Statements - Sequential Design Problems using Processes - Generic and generate statements - Modeling of digital system - Types of Modeling : Dataflow, Behavioral and Structural.

### Unit II – Simulation and Synthesis
8

Simulation - Functional and Timing - VITAL simulation – Synthesis - Place and Route - Test benches for VHDL – Hands on exercises : Functional verification and synthesis of Combinational system (Gates, Adder, Subtractor, Multiplexer, Demultiplexer, etc) and Sequential system (Flipflops, Counters, Shift register, etc) using VHDL with Xilinx ISE tool.

**Total Periods: 15**

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

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

| 3 | High | | 2 | Medium | | 1 | Low | |
|---|---|---|---|---|---|---|---|---|

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---|---|---|
| | Assessment 1 (50 Marks) | Assessment 2 (50 Marks) |
| Remember | 10 | 10 |
| Understand | 10 | 10 |
| Apply | 30 | 30 |
| Analyze | | |
| Evaluate | | |
| Create | | |

| 23ECA03 | COMPUTER VISION FOR EMBEDDED SYSTEM | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| Nature of course | Employability Enhancement Course | | | | |
| Pre requisites | Fundamentals of Computer applications | | | | |

## Course Objectives

The course is intended to

1. Study the concepts of computer vision with Embedded system
2. Explore the various computer vision applications

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No. | Course Outcome | Bloom's Level |
|---|---|---|
| CO 1 | Understand the basics of computer visions in Embedded system | Understand |
| CO 2 | Demonstrate the computer vision applications | Apply |

## Course Contents

### Unit I – Introduction to Computer Vision for Embedded system                8

Overview, image data formats, OpenCV, Edge detection and segmentation, Applications of computer vision in embedded systems, Datasets, bias, privacy, competitions, Machine learning and PyTorch, Performance and resources (time, memory, accuracy).

### Unit II – Computer vision Application                7

Object detection and motion tracking, image Classifier implementation in embedded system, Convolution Neural Network, Data augmentation, Data annotation and generation.

**Total Periods: 15**

| | \multicolumn{12}{c}{POs} | | | | | | | | | | | \multicolumn{3}{c}{PSOs} | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 3 | 2 | | | 3 | | | | | | 2 | 2 | 1 | 3 | |
| CO2 | 3 | 2 | | | 3 | | | | | | 2 | 2 | 1 | 3 | |
| | 3 | \multicolumn{3}{c}{High} | 2 | \multicolumn{3}{c}{Medium} | | | 1 | \multicolumn{2}{c}{Low} | | | |

**Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)**

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---|---|---|
| | Assessment 1 (50 Marks) | Assessment 2 (50 Marks) |
| Remember | | |
| Understand | 20 | 20 |
| Apply | 30 | 30 |
| Analyze | | |
| Evaluate | | |
| Create | | |

| 23ECA04 | Data Analytics with Power BI | L | T | P | C |
|---------|------------------------------|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| Nature of course | Employability Enhancement Course | | | | |
| Pre requisites | Fundamentals of Data Science | | | | |

## Course Objectives

The course is intended to
1. Learn the concepts of data analytics with Power BI.

## Course Outcomes

On successful completion of the course, students will be able to

| CO. No | Course Outcome | Bloom's Level |
|--------|----------------|---------------|
| CO 1 | Study the basics of Power BI | Understand |
| CO 2 | Hands-on for developing data analysis with power BI | Apply |

## Course Contents

### Unit I - Power BI Concepts 7

Introduction - Power BI concepts - Data modeling and visualizations: App Source Power BI visuals – aggregates -Security and administration - case study - Power BI in action - View content in Power BI service - Explore with dashboards, reports, and apps in Power BI - Find and view dashboards and reports.

### Unit II – Data Analysis 8

Overview of data analysis - Building blocks of Power BI - Develop with Power Platform: Introduction to developing with Microsoft Power Platform - Prepare data for analysis - Model data in Power BI - Visualize data in Power BI - Data analysis in Power BI.

**Total: 15 Periods**

| | Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | POs | | | | | | | | | | | | PSOs | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO1 | 2 | 2 | 2 | | | | | | | | | | 2 | 2 | 2 |
| CO2 | 2 | 2 | 2 | 3 | 3 | | | | | | | 3 | 2 | 2 | 3 |
| | 3 | | High | | | 2 | | Medium | | | | 1 | Low | | |

| Bloom's Level | Summative Assessment (Internal Mode) | |
|---------------|--------------------------------------|----|
| | Assessment 1 (50 Marks) | Assessment 2 (50 Marks) |
| Remember | 10 | 10 |
| Understand | 10 | 10 |
| Apply | 30 | 30 |
| Analyze | | |
| Evaluate | | |
| Create | | |