Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

*(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)*

**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110

# Bachelor of Technology

# SoE & Syllabus 2022

## 1st to 6th Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's

**Yeshwantrao Chavan College of Engineering**

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **FIRST SEMESTER** | | | | | | | | | | | | | | | |
| 1 | 1 | BS | GE/MTH | 22ET101 | Differential and Integral Calculus | T | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hrs |
| 2 | 1 | BS | GE/CHE | 22ET102 | Engineering Chemistry | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 3 | 1 | BS | GE/CHE | 22ET103 | Lab: Engineering Chemistry | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 4 | 1 | HS | GE/HUM | 22ET104 | Professional Communication | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 5 | 1 | BES | CV/CV | 22ET105 | Engineering Mechanics | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 6 | 1 | BES | CV/CV | 22ET106 | Lab: Engineering Mechanics | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 1 | BES | EE/EE | 22ET107 | Basic Electrical and Electronics Engineering | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 8 | 1 | BES | IT/IT | 22ET108 | Programming for Problem Solving | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 9 | 1 | BES | IT/IT | 22ET109 | Lab: Programming for Problem Solving | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | | **TOTAL** | **18** | **1** | **6** | **25** | **22** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 1 | HS | GE/HUM | GE2131 | Universal Human Value | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 1 | HS | GE/T&P | MLC2121 | YCAP1-Get Set Go | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SECOND SEMESTER** | | | | | | | | | | | | | | | |
| 1 | 2 | BS | GE/MTH | 22ET201 | Differential Equation, Complex Variables & Matrices | T | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hrs |
| 2 | 2 | BS | GE/PHY | 22ET202 | Engineering Physics | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 3 | 2 | BS | GE/PHY | 22ET203 | Lab: Engineering Physics | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 4 | 2 | HS | GE/HUM | 22ET204 | Social Science | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 5 | 2 | BES | ME/ME | 22ET205 | Engineering Graphics | T | 1 | 0 | 0 | 1 | 1 | 30 | 20 | 50 | 3 Hrs |
| 6 | 2 | BES | ME/ME | 22ET206 | Lab: Engineering Graphics | P | 0 | 0 | 4 | 4 | 2 | | 60 | 40 | |
| 7 | 2 | BES | CT/CT | 22ET207 | Elements of AIML | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 8 | 2 | BES | EL/EL | 22ET208 | Electrical workshop | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 9 | 2 | BES | ET/ET | 22ET209 | Digital Logic Design | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 10 | 2 | BES | ET/ET | 22ET210 | Lab: Digital Logic Design | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | | **TOTAL** | **16** | **1** | **10** | **27** | **22** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 2 | HS | GE/T&P | MLC2122 | YCAP2 -Functional English | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 2 | BES | GE/CHE | GE2132 | Environmental Science | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

**MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | | |
|---|---|---|---|---|
| | | June 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Date of Release | Version | |

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**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Third Semester** | | | | | | | | | | | | | | | |
| 1 | 3 | BS | ET/ET | 22ET301 | Signals & Systems | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 3 | BS | ET/ET | 22ET302 | Lab:Signals & Systems | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 3 | 3 | HS | GE/HUM | 22ET303 | Fundamentals of Management and Economics | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 3 | PC | ET/ET | 22ET304 | Electronic Devices and Circuits | **T** | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hours |
| 5 | 3 | PC | ET/ET | 22ET305 | Lab: Electronic Devices and Circuits | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 6 | 3 | PC | ET/ET | 22ET306 | Digital System Design | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 7 | 3 | PC | ET/ET | 22ET307 | Lab: Digital System Design | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 8 | 3 | PC | ET/ET | 22ET308 | Computer Organization | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 3 | PC | ET/ET | 22ET309 | Network Theory | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 3 | PC | CV/ET | 22ET310 | Environmental Sustainability, Pollution and Management | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| | | | | | **TOTAL THIRD SEM** | | **21** | **1** | **6** | **28** | **25** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 3 | HS | T&P | MLC2123 | YCCE Communication Aptitude Preparation (YCAP3) | **A** | 3 | 0 | 0 | 3 | 0 | | | | |
| 2 | 3 | | ET/ET | MLC109 | Exploring MATLAB | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| **Fourth Semster** | | | | | | | | | | | | | | | |
| 1 | 4 | BS | GE/MTH | 22ET401 | Probability and Statistical Theory | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 4 | PC | ET/ET | 22ET402 | Electromagnetic Fields | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 3 | 4 | PC | ET/ET | 22ET403 | Microcontroller and Interfacing | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 4 | PC | ET/ET | 22ET404 | Lab: Microcontroller and Interfacing | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 5 | 4 | PC | ET/ET | 22ET405 | Analog Communication | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 4 | PC | ET/ET | 22ET406 | Lab.: Analog Communication | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 4 | PC | ET/ET | 22ET407 | Control Systems | **T** | 3 | 0 | 0 | 4 | 3 | 30 | 20 | 50 | 3 Hours |
| 8 | 4 | PC | ET/ET | 22ET408 | Lab.: Control Systems | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 9 | 4 | PC | ET/ET | 22ET409 | Object Oriented Programming | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 4 | PC | ET/ET | 22ET410 | Lab.: Object Oriented Programming | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | **TOTAL FOURTH SEM** | | **18** | **1** | **8** | **27** | **22** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 4 | HS | T&P | MLC2124 | YCCE Communication Aptitude Prepartion (YCAP 4) | **A** | 3 | 0 | 0 | 3 | 0 | | | | |
| 2 | 4 | | ET/ET | MLC110 | Embedded System & IoT | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

**MSEs* = Two MSEs of 15 Marks each will be conducted and marks 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2023** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

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**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Fifth Semester** | | | | | | | | | | | | | | | |
| 1 | 5 | PC | ET/ET | 22ET501 | Digital Communication | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 5 | PC | ET/ET | 22ET502 | Lab:Digital Communication | P | 0 | 0 | 2 | 1 | 1 | | 60 | 40 | |
| 3 | 5 | PC | ET/ET | 22ET503 | Analog Circuits | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 5 | PC | ET/ET | 22ET504 | Lab:Analog Circuits | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 5 | 5 | PC | ET/ET | 22ET505 | Fields & Radiating System | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 5 | PE | ET/ET | | Professional Elective I | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 7 | 5 | PE | ET/ET | | Lab:Professional Elective I | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 8 | 5 | OE-I | ET/ET | | Open Elective - I * | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 5 | OE -II | ET/ET | | Open Elective - II * | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 5 | PC | ET/ET | 22ET506 | Lab.: Electronics Design Workshop | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 11 | 5 | STR | ET/ET | 22ET507 | Industrial training, Seminar & Report | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | **TOTAL FIFTH SEM** | | **18** | **0** | **10** | **27** | **23** | | | | |

| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | HS | T&P | MLC2125 | **YCAP5 :** | A | 3 | 0 | 0 | 3 | 0 | |
| 2 | 5 | | R&D | MLC125 | Design thinking | A | 2 | 0 | 0 | 2 | 0 | |

Professional Elective-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | PE | PC | 22ET511 | PE I : CMOS VLSI Design |
| 2 | 5 | PE | PC | 22ET512 | PE I :Lab:CMOS VLSI Design |
| 3 | 5 | PE | PC | 22ET513 | PE I : Sensors & Wearable Device |
| 4 | 5 | PE | PC | 22ET514 | PE I :Lab: Sensors & Wearable Device |
| 5 | 5 | PE | PC | 22ET515 | PE I : Discrete Structures and Algorithms |
| 6 | 5 | PE | PC | 22ET516 | PE I :Lab: Discrete Structures and Algorithms |
| 7 | 5 | PE | PC | 22ET517 | PE I : Optical Communication |
| 8 | 5 | PE | PC | 22ET518 | PE I :Lab: Optical Communication |
| 9 | 5 | PE | PC | 22ET519 | PE I : Digital Image Processing |
| 10 | 5 | PE | PC | 22ET520 | PE I :Lab: Digital Image Processing |
| 11 | 5 | PE | PC | 22ET521 | PEI: Internet of Things |
| 12 | 5 | PE | PC | 22ET522 | PEI: Lab: Internet of Things |

**Open Electives -I**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | OE I | PC | 22ET531 | OE I : Principles of Communication |
| 2 | 5 | OE I | PC | 22ET532 | OE I : Industrial Automation |
| 3 | 5 | OE I | PC | 22ET533 | OE I :Medical Electronics |
| 4 | 5 | OE I | PC | 22ET534 | OE I : Fundamentals of Image Processing |

**Open Electives -II**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | OE II | PC | 22ET551 | OE II :Fundamentals of Computer Networks |
| 2 | 5 | OE II | PC | 22ET552 | OE II :Soft Computing |
| 3 | 5 | OE II | PC | 22ET553 | OE II : Microcontrollers & Embedded systems |
| 4 | 5 | OE II | PC | 22ET554 | OE II : Fundamentals of Internet of Things |

**MSEs* = Two MSEs of 15 Marks each will be conducted and marks 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2022** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

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**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Sixth Semester** | | | | | | | | | | | | | | | |
| 1 | 6 | PC | ET/ET | 22ET601 | Digital Signal Processing | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 6 | PC | ET/ET | 22ET602 | Lab:Digital Signal Processing | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 3 | 6 | PC | ET/ET | 22ET603 | Antennas & Wave Propagation | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 6 | PC | ET/ET | 22ET604 | Lab:Antennas & Wave Propagation | **P** | 3 | 0 | 0 | 3 | 1 | 30 | 20 | 50 | 3 Hours |
| 5 | 6 | PE | ET/ET | | **Professional Elective II** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 6 | PE | ET/ET | | **Lab: Professional Elective II** | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 6 | PE | ET/ET | | **Professional Elective III** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 8 | 6 | OE-III | ET/ET | | **Open Elective - III **** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 6 | OE-IV | ET/ET | | **Open Elective - IV **** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 6 | PR | ET/ET | 22ET605 | Project Phase I | **P** | 0 | 0 | 4 | 4 | 2 | | 60 | 40 | |
| | | | | | **TOTAL SIXTH SEM** | | **21** | **0** | **8** | **29** | **23** | | | | |

| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6 | HS | | MLC126 | YCCE Communication Aptitude Preparation (YCAP6) | | A | 3 | 0 | **0** | 3 | 0 |

**Professional Electives -II**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | PE II | PC | 22ET611 | PE II : Analog VLSI Design |
| 2 | 6 | PE II | PC | 22ET612 | PE II : Lab: Analog VLSI Design |
| 3 | 6 | PE II | PC | 22ET613 | PE II : Machine Learning |
| 4 | 6 | PE II | PC | 22ET614 | PE II : Lab : Machine Learning |
| 5 | 6 | PE II | PC | 22ET615 | PE II : Embedded System Design |
| 6 | 6 | PE II | PC | 22ET616 | PE II :Lab Embedded System Design |
| 7 | 6 | PE II | PC | 22ET617 | PE II : Multimedia Communication |
| 8 | 6 | PE II | PC | 22ET618 | PE II : Lab Multimedia Communication |
| 9 | 6 | PE II | PC | 22ET619 | PE II : Digital Image Analysis for Remote Sensing Application |
| 10 | 6 | PE II | PC | 22ET620 | PE II : Lab Digital Image Analysis for Remote Sensing Application |
| 11 | 6 | PE II | PC | 22ET621 | PEII: Radio Frequency Circuit Design |
| 12 | 6 | PE II | PC | 22ET622 | PEII:Lab Radio Frequency Circuit Design |

**Professional Electives -III**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | PE III | PC | 22ET641 | PE III : Introduction to Photonics |
| 2 | 6 | PE III | PC | 22ET642 | PE III : Wireless Mobile Communication |
| 3 | 6 | PE III | PC | 22ET643 | PE III : Soft Computing & Application |
| 4 | 6 | PE III | PC | 22ET644 | PE III : Power Electronics |
| 5 | 6 | PE III | PC | 22ET645 | PE III : Information Theory and coding |
| 6 | 6 | PE III | PC | 22ET646 | PE III : VLSI Testing and Verification |

**Open Electives -III**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | OE III | PC | 22ET661 | OE III : Principles of Communication |
| 2 | 6 | OE III | PC | 22ET662 | OE III : Industrial Automation |
| 3 | 6 | OE III | PC | 22ET663 | OE III :Medical Electronics |
| 4 | 6 | OE III | PC | 22ET664 | OE III : Fundamentals of Image Processing |

**Open Electives -IV**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | OE IV | PC | 22ET681 | OE IV :Fundamentals of Computer Networks |
| 2 | 6 | OE IV | PC | 22ET682 | OE IV :Soft Computing |
| 3 | 6 | OE IV | PC | 22ET683 | OE IV : Microcontrollers & Embedded systems |
| 4 | 6 | OE IV | PC | 22ET684 | OE IV : Fundamentals of Internet of Things |

**MSEs* = Three MSEs of 15 Marks each will be conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2022** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

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**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110


# Bachelor of Technology

# SoE & Syllabus 2022

## 1st Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

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**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **FIRST SEMESTER** | | | | | | | | | | | | | | | |
| 1 | 1 | BS | GE/MTH | 22ET101 | Differential and Integral Calculus | T | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hrs |
| 2 | 1 | BS | GE/CHE | 22ET102 | Engineering Chemistry | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 3 | 1 | BS | GE/CHE | 22ET103 | Lab: Engineering Chemistry | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 4 | 1 | HS | GE/HUM | 22ET104 | Professional Communication | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 5 | 1 | BES | CV/CV | 22ET105 | Engineering Mechanics | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 6 | 1 | BES | CV/CV | 22ET106 | Lab: Engineering Mechanics | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 1 | BES | EE/EE | 22ET107 | Basic Electrical and Electronics Engineering | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 8 | 1 | BES | IT/IT | 22ET108 | Programming for Problem Solving | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 9 | 1 | BES | IT/IT | 22ET109 | Lab: Programming for Problem Solving | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | | **TOTAL** | **18** | **1** | **6** | **25** | **22** | | | | |
| **List of Mandetory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 1 | HS | GE/HUM | GE2131 | Universal Human Value | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 1 | HS | GE/T&P | MLC2121 | YCAP1-Get Set Go | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SECOND SEMESTER** | | | | | | | | | | | | | | | |
| 1 | 2 | BS | GE/MTH | 22ET201 | Differential Equation, Complex Variables & Matrices | T | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hrs |
| 2 | 2 | BS | GE/PHY | 22ET202 | Engineering Physics | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 3 | 2 | BS | GE/PHY | 22ET203 | Lab: Engineering Physics | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 4 | 2 | HS | GE/HUM | 22ET204 | Social Science | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 5 | 2 | BES | ME/ME | 22ET205 | Engineering Graphics | T | 1 | 0 | 0 | 1 | 1 | 30 | 20 | 50 | 3 Hrs |
| 6 | 2 | BES | ME/ME | 22ET206 | Lab: Engineering Graphics | P | 0 | 0 | 4 | 4 | 2 | | 60 | 40 | |
| 7 | 2 | BES | CT/CT | 22ET207 | Elements of AIML | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 8 | 2 | BES | EL/EL | 22ET208 | Electrical workshop | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 9 | 2 | BES | ET/ET | 22ET209 | Digital Logic Design | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 10 | 2 | BES | ET/ET | 22ET210 | Lab: Digital Logic Design | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | | **TOTAL** | **16** | **1** | **10** | **27** | **22** | | | | |
| **List of Mandetory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 2 | HS | GE/T&P | MLC2122 | YCAP2 -Functional English | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 2 | BES | GE/CHE | GE2132 | Environmental Science | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

**MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2022** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

## I SEMESTER

## 22ET101 : Differential and Integral Calculus

| **Course Outcomes :** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Apply the knowledge of differentiation to solve the Engineering problems. |
| 2. Determine the derivatives of functions of several variables and develop the mathematical equation. |
| 3. Apply the knowledge of Beta and Gamma functions to solve the integrals. |
| 4. Evaluate the multiple integrals and apply it to compute the area and volume of various structures. |

| **Unit I: Differential Calculus I** | **(6 Hrs.)** |
|---|---|
| Successive differentiation, $n^{th}$ derivative of rational function, Trigonometrical transformations, $n^{th}$ derivative of the product of two functions (Leibnitz's theorem), Taylor's theorem, Use of Maclaurin's theorem for one variable, standard expansions, Examples on Taylor's Theorem. **(Contemporary Issues related to Topic)** | |
| **Unit II: Differential Calculus II** | **(6 Hrs.)** |
| Definitions of Curvature, Radius of curvature for cartesian curves, Centre of curvature, Circle of curvature, Procedure for tracing the cartesian curve, Important points (singular points, Multiple points, Double points, Node, Cusp), Problems on tracing of curve. **(Contemporary Issues related to Topic)** | |
| **Unit III: Partial Differentiation** | **(7 Hrs.)** |
| Functions of several variables, First and higher order derivatives, Homogeneous functions, Euler's theorem on homogeneous function, Chain rule and total differential coefficient of composite functions. **(Contemporary Issues related to Topic)** | |
| **Unit IV: Integral Calculus** | **(6 Hrs.)** |
| **G**amma function, Reduction formula, Transformation of **G**amma function, Beta function, Properties of Beta function, Transformation of Beta function, Relation between Beta and Gamma functions, Differentiation under the integral sign. **(Contemporary Issues related to Topic)** | |
| **Unit V: Multiple integrals** | **(7 Hrs.)** |
| Elementary double integrals and triple integrals, Change of variables (simple transformations) and Jacobian of transformations, Change of order of integration (Cartesian and polar). **(Contemporary Issues related to Topic)** | |
| **Unit VI: Application of Multiple Integral** | **(7 Hrs.)** |
| Surface area, Calculation of mass, Centre of gravity of an arc and Centre of gravity of an area, Volume of solid by revolution of an area (Double integral). **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| Textbooks: | |
|---|---|
| 1. | Erwin Kreyzig, Advance Engineering Mathematics, 6th Edition, John Wiley and Sons, INC. |
| 2. | H.K. Dass, Engineering Mathematics, 11th revised edition, S. Chand, Delhi. |
| 3. | H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi. |
| 4. | Dr. B.S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers. |
| 5. | P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan. |

| Reference Books: | |
|---|---|
| 1. | G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999. |
| 2. | Michael Spivak and Tom Apostol, Calculus, VolI & Vol II 2nd edition, Wiley. |
| 3. | N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10th edition, Laxmi Prakashan. |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| 1 | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/ |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://nptel.ac.in/courses/111/106/111106146/ |
| 2. | https://nitkkr.ac.in/docs/5-Multiple%20Integrals%20and%20their%20Applications.pdf |
| 3. | https://nptel.ac.in/courses/111/106/111106100/ |

## I SEMESTER

## 22ET102 : Engineering Chemistry

| **Course Outcomes :** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Illustrate qualitative and quantitative aspects of water for industrial and domestic applications. (L2)<br>2. Apply concepts of electrochemistry for energy storage devices. (L3)<br>3. Identify corrosion and discuss its prevention. (L2)<br>4. Establish insight into engineering materials. (L3) |

| **Unit I : Water Conditioning** | **(7 Hrs.)** |
|---|---|
| Introduction, Hardness, Types of hardness, softening of water by lime-soda process, Zeolite process, (principle, advantages, and limitations). Numerical based on lime-soda and Zeolite process. Boiler troubles (Scale and sludge, caustic embrittlement), sequestration (carbonate, phosphate) Sterilization of drinking water by chlorination **(Contemporary Issues related to Topic)** | |

| **Unit II: Electrochemistry** | **(6 Hrs.)** |
|---|---|
| Introduction, metallic and electrolytic conductance, resistance, specific resistance, conductance, specific conductance, equivalent and molar conductance. Variation of conductance with dilution. Electrode and electrode potentials. Nernst Equation. Faraday's laws and Numerical. Industrial applications: Electroforming, Electrowinning, Electrolytic refining. **(Contemporary Issues related to Topic)** | |

| **Unit III: Energy Storage Devices Basic concepts** | **(6 Hrs.)** |
|---|---|
| **Unit III** Primary and secondary battery. Energy density, power density, energy efficiency, cycle life, shelf life. Secondary battery: Ni-metal hydride battery, Lithium-ion battery. H2-O2 Fuel cell: Principle, working, advantages, disadvantages, applications. Differences between battery and a fuel cell. Supercapacitors: Definition, types, characteristics, and application. **(Contemporary Issues related to Topic)** | |

| **Unit IV: Corrosion** | **(7 Hrs.)** |
|---|---|
| Introduction to corrosion, electrochemical and galvanic series,<br>**Types of corrosion:** Chemical and electrochemical corrosion. Mechanisms of electrochemical corrosion, Factors influencing corrosion. Differential aeration theory of corrosion,<br>**Forms of corrosion:** Pitting corrosion, Intergranular corrosion, Stress corrosion, Waterline. **Corrosion prevention:** Design and material selection, Cathodic and anodic protection.<br>**(Contemporary Issues related to Topic)** | |

| **Unit V: Lubricants** | **(6 Hrs.)** |
|---|---|
| Introduction, Classification of lubricants, Mechanism of lubrication.<br>Liquid lubricants, Properties of liquid lubricants & significance–Viscosity and viscosity index., Flash and fire point, Cloud and pour point, Aniline point, acid value, saponification number, Steam Emulsion Number.<br>Solid lubricant-Graphite.<br>Greases as Semisolid lubricants - Consistency test and drop point test. Synthetic lubricants- silicones.<br>Criteria for selection of lubricants: IC engines, gears, refrigeration, transformer, steam turbines, delicate instruments. **(Contemporary Issues related to Topic)** | |

| Unit VI: Polymeric Materials | (7 Hrs.) |
|---|---|
| Nanomaterials: Definition, Carbon Nanotubes and types.<br>Applications of nanomaterials in electronics.<br>Conducting Polymers: Intrinsic and extrinsic conducting polymers, doping, factors responsible for conduction. General properties and applications of conducting polymers.<br>Liquid Crystal Polymers: Phases of LCP's, general properties and applications.<br>Polymers in electronic industries: Piezo, pyroelectric, Ferroelectric polymers.<br>Smart materials: Properties and applications of shape memory alloys, chromo active, photoactive and magneto rheological materials. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

| Textbooks: | |
|---|---|
| 1. | S S. Dara , A Text book of Engineering Chemistry , S.Chand & Co New Delhi. Eleventh Edition. |
| 2. | P.C. Jain and Monica Jain , Engineering Chemistry , Dhanpat Rai & sons New Delhi , Sixteenth Edition. |
| 3. | P. W. Atkins, Physical Chemistry ,Oxford Publications,Eighth edition . |

| Reference Books: | |
|---|---|
| 1. | Eskel Nordell , Water treatment for industrial and other use ,Rein hold Publishing Corporation, New York. |
| 2. | Lloyd A.Munro ,Chemistry in Engineering ,Prentice-hall, Inc Nj,2nd Edition. |
| 3. | Robert B Leighou Mc Graw ,Chemistry of Engineering Materials ,Hill Book Company, Inc New York. |
| 4. | B.K.Sharma Krishna , Engineering Chemistry ,Prakashan media private LTD. 1st Edition, 2014. |
| 5. | R.V.Gadag, A.Nityananda Shetty ,Engineering Chemistry ,I K International Publishing House New Delhi , First Edition. |
| 6 | Fred. Billmeyer Jr. ,A textbook of polymer science, Wiley India ,Third Edition. |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| 1 | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/CHEMISTRY/ |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://www.youtube.com/watch?v=dCimAH5IRSA |
| 2. | https://www.youtube.com/watch?v=XTt3gXB0a84 |
| 3. | https://www.youtube.com/watch?v=5OxdXq91TV0 |
| 4. | https://www.youtube.com/watch?v=aoWBUhlN3-0 |
| 5. | https://www.youtube.com/watch?v=JfJ7MlP9Dco |

# I SEMESTER

## 22ET103 : Lab : Engineering Chemistry

| **Course Outcomes** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Illustrate qualitative and quantitative aspects of water for industrial and domestic applications. (L2) |
| 2. Apply concepts of electrochemistry for energy storage devices. (L3) |
| 3. Identify corrosion and discuss its prevention. (L2) |
| 4. Establish insight into engineering materials. (L3) |

**Total 10 experiments are to be performed**
**(4 each from Phase I and Phase II and two demonstration experiments)**

| SN | **Experiments based on** |
|---|---|
| | **List of Experiments-Phase I** |
| 1 | Determination of total hardness of water sample. |
| 2 | Determination of alkalinity present in the water sample. |
| 3 | Estimation of Fe2+ ions by redox titration |
| 4 | Determination of copper by iodometric titration |
| 5 | Estimation of Nickel. |
| 6 | To determine the strength of a given potassium dichromate solution with N/20 sodium thiosulphate solution |
| 7 | Determination of COD of water sample. |
| 8 | Synthesis of polyaniline. |
| 9 | Determination of rate of the reaction of hydrolysis of ethyl acetate at room temperature and analysis of experimental data using Computational Software. |
| | **List of Experiments-Phase II** |
| 1 | Determination of viscosity of lubricating oil by Redwood Viscometer I or II |
| 2 | Determination of Cation exchange capacity of an ion exchange resin |
| 3 | Determination of molecular weight of a polymer. |
| 4 | Oil Testing for Flash Point / Cloud Point/Pour Point/Aniline Point |
| 5 | Proximate analysis of coal |
| 6 | Determination of surface tension of liquids using stalagmometer. |
| 7 | Determination of electrochemical equivalence of Copper using Faradays Law |
| 8 | To determine the heat of solution of potassium nitrate calorimetrically. |
| 9 | Determination of conductivity of water sample by conductivity meter. |
| 10. | To verify Beer-Lambert law for KMnO4 and determine the concentration of the given solution of KMnO4 |

| | **List of Demonstration Experiments** |
|---|---|
| 1 | Determination of pH of water sample by pH meter |
| 2 | Synthesis of urea formaldehyde resin. |
| 3 | Determination of consistency of grease sample by using penetrometer. |
| 4 | Determination of Drop Point of grease sample. |

## I SEMESTER

## 22ET104 : Professional Communication

| **Course Outcomes :** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Apply different modes for effective communication.<br>2. Use competently phonology of English language.<br>3. Apply nuances of LSRW skills.<br>4. Communicate through different channels. |

| **Unit I: Basics of Communication** | **(7 Hrs.)** |
|---|---|
| Language as a tool of communication & characteristics of language Process of Communication, Levels of Communication, Flow of Communication, Networks of Communication, Classification of Barriers (Intrapersonal, Interpersonal, Organizational). **(Contemporary Issues related to Topic)** | |
| **Unit II: English Phonetics** | **(6 Hrs.)** |
| Speech Mechanism, Organs of speech, Consonant and Vowels sounds, Word stress rules. **(Contemporary Issues related to Topic)** | |
| **Unit III: Presentation & Visual Communication** | **(7 Hrs.)** |
| Presentation and audience analysis, Organizing content, Nuances of presentation, Visual Communication – Introduction & importance, Role & Psychology of color in visual communication. **(Contemporary Issues related to Topic)** | |
| **Unit IV: Verbal Skills** | **(7 Hrs.)** |
| Listening Skills -definition types and traits.<br>Group Communication- (Purpose, Different types of Group Communication, Organizational GD, GD as a part of selection process), Meeting ( purposes, preparation, procedure and minutes of meeting). **(Contemporary Issues related to Topic)** | |
| **Unit V: Interview Skills** | **(6 Hrs.)** |
| Purpose, expectations of employer and preparation for Interview, Types, Types of Questions & Answering Techniques, Telephonic Interviews – preparation and guidelines, Reading Techniques (Exercise based on Complex Unseen passages. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Technical Written Communication** | **(6 Hrs.)** |
| Memo, Email, Report -Types, Characteristics, prewriting aspects of report and preparing writing aspects of report), Types of paragraphs. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

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|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| Textbooks: | |
|---|---|
| 1. | Raman & Sharma, Technical Communication, Oxford University Press. |
| 2. | T. Balasubramaniam, Textbook of English Phonetics for Indian Students, Macmillan India Ltd. |

| Reference Books: | |
|---|---|
| 1. | Public Speaking, Dale Carnegie, How to Develop Self – Confidence & Influence People. |
| 2. | Asha Kaul, Communication Skills. |
| 3. | Allen Peas, Body Language. |
| 4. | Gerson's Gerson, Technical Communication. |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://dl.uswr.ac.ir/bitstream/Hannan/141245/1/9781138219120.pdf |
| 2. | https://www.pdfdrive.com/word-power-made-easy-the-complete-handbook-for-building-a-superior-vocabulary-e157841139.html |
| 3 | https://www.pdfdrive.com/improve-your-communication-skills-present-with-confidence-write-with-style-learn-skills-of-persuasion-e156963640.html |
| 4 | https://www.pdfdrive.com/21-days-of-effective-communication-everyday-habits-and-exercises-to-improve-your-communication-skills-and-social-intelligence-e158273760.html |

## I SEMESTER

## 22ET105 : Engineering Mechanics

**Course Outcomes :**

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

1. Describe the fundamental concepts of statics and dynamics.
2. Apply the basic concepts of applied mechanics for solution of problems on planar force system.
3. Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body.
4. Analyze pin jointed truss frame structure and beam structure analytically and graphically.
5. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

| **Unit I: Resultant of planar force System** | **(7 Hrs.)** |
|---|---|
| Fundamental concepts, system of forces, laws of mechanics, principle of transmissibility of force, Moment of force, Principle of moment, Couple, Resultant of a planar force system, Equivalent force couple system. **(Contemporary Issues related to Topic)** | |
| **Unit II: Equilibrium of planar force System** | **(6 Hrs.)** |
| Free body diagrams, Conditions of equilibrium, types of supports, types of beams, types of loads on beam, Equilibrium of a planar force system. **(Contemporary Issues related to Topic)** | |
| **Unit III: Friction and Trusses** | **(7 Hrs.)** |
| Friction: Coulomb's laws of dry friction, plane friction, belt friction.<br>Trusses: Types of trusses, assumptions in analysis of truss, Analysis of truss by method of joint.<br>**(Contemporary Issues related to Topic)** | |
| **Unit IV: Properties of Surfaces** | **(6 Hrs.)** |
| Centroid: Introduction, First Moment of Area, Centroid of composite areas.<br>Moment of Inertia: Introduction, Second Moment of Area, Polar moment of Inertia, Radius of Gyration, Transfer formula for moment of Inertia, Product of Inertia, Moment of Inertia, and product of inertia for composite areas, Principal Moments of Inertia. **(Contemporary Issues related to Topic)** | |
| **Unit V: Virtual Work Method and Kinetics of Particle** | **(7 Hrs.)** |
| Virtual Work Method: Introduction, Principle of virtual work, Application to beam and frame.<br>Kinetics of Particle: Introduction, Newton's law of motion for a Particle, D' Alembert's principle, Translation of particle and connected system. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Work Energy and Impulse Momentum Method** | **(6 Hrs.)** |
| Work Energy Method: Introduction, Work energy equation for translation, Work energy applied to particle motion and connected system.<br>Impulse Momentum Method: Introduction, Linear Impulse momentum, Conservation of linear momentum, coefficient of restitution, elastic impact, Impulse momentum in plane motion. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks:** | |
| 1. | Nelson A., Engineering Mechanics (Statics and Dynamics), ed 2009, Tata Mc. Grew Hill Education Pvt. Ltd., New Delhi, 2009. |
| 2. | Dubey N.H., Engineering Mechanics (Statics and Dynamics) first edition 2013, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi, 2013. |
| 3. | Singer F.L, Engineering Mechanics (Statics and Dynamics), Harper and Rowe publication, New Delhi, 1994. |
| **Reference Books:** | |
| 1. | Timoshenko S, Young D.H and Rao J.V, Engineering Mechanics, Mc. Graw Hill Publication, New Delhi, 2007. |
| 2. | Bhattacharyya B., Engineering Mechanics, Oxford University Press, New Delhi, 2008. |
| 3. | Hibbeler R.C, Engineering Mechanics (Statics and Dynamics), Pearson Publication, Singapore, 2000. |
| 4. | Shames I.H. and Rao J.V., Engineering Mechanics (Statics and Dynamics), First Edition, Pearson Publication, New Delhi, 2003. |
| 5. | Beer F.P. and Johnston E.R; Vector Mechanics for Engineers, 9th edition Tata Mc. Graw Hill Publication, New Delhi. 2007. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| 1 | chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/78.%20Engineering-Mechanics-Statics-and-Dinamics-E-W-Nelson-C-L-Best-W-G-McLean-1st-Ed-1997-Schaum-Outline-McGraw-Hill%20(1).pdf |
| 2 | chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/79.%20Engineering%20Mechanics.%20Statics-%20MERIAM%20%20AND%20KRAIGE.pdf |
| 3 | chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/81.%20Engineering%20Mechanics%201.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| 1. | https://www.youtube.com/watch?v=nGfVTNfNwnk |
| 2. | https://www.youtube.com/watch?v=6nguX-cEsvw |
| 3. | https://nptel.ac.in/courses/112103108 |

# I SEMESTER

## 22ET106 : Lab : Engineering Mechanics

| **Course Outcomes** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Describe the fundamental concepts of statics and dynamics.<br>2. Apply the basic concepts of applied mechanics for solution of problems on planar force system.<br>3. Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body.<br>4. Analyze pin jointed truss frame structure and beam structure analytically and graphically.<br>5. Evaluate the dynamic variables of kinetics of particles and simple lifting machine |

**Minimum Eight Practical's to be performed from the list as below**

| SN | **Experiments based on** |
|---|---|
| 1 | To find determine the support reactions of a Simply Supported Beam experimentally and analytically. |
| 2 | To determine the forces in the members of a Jib Crane Apparatus experimentally and graphically. |
| 3 | To determine the coefficient of friction between two surfaces of different material on Plane Friction Apparatus. |
| 4 | To determine the coefficient of friction of Coil Friction Apparatus. |
| 5 | To determine the forces in members of a Shear Leg Apparatus experimentally and manually. |
| 6 | To determine the mass moment of inertia of a fly wheel using Fly Wheel Apparatus |
| 7 | To determine efficiency and law of machine of Differential Axel & Wheel machine. |
| 8 | To determine efficiency and Law of machine of Single Purchase Crab machine. |
| 9 | To determine efficiency and Law of machine of Double Purchase Crab machine. |
| 10 | To verify law of polygonal of forces using Law of Polygon Apparatus. |
| 11 | To find support reactions of a simply supported beam using graphical method and hand calculation. |
| 12. | To find the forces in the member of truss using graphical method and hand calculation. |
| 13. | To find (1) Principle moment of inertia and (2) Moment of inertia and product of inertia about any inclined axis for a composite figure using Mohr's circle and hand calculation, |

## I SEMESTER

## 22ET107 : Basic Electrical and Electronics Engineering

| **Course Outcomes :** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Understand the fundamental concepts of Analog Electronic and Electrical Circuits |
| 2. Apply the concepts of Electrical and Electronic Circuits to obtain the desired parameter |
| 3. Analyse analog Electrical Circuits for given application. |
| 4.Analyze analog Electronic Circuits for given application. |

| **Unit I: CIRCUIT ELEMENTS AND ENERGY SOURCES** | **(7 Hrs.)** |
|---|---|
| Circuit Elements, Series and Parallel Combination of Resistances, Inductance and Capacitances, Energy Sources, Source Transformation, Sources with Periodic Waveforms, A.C. in Inductance and Capacitance, Star-Delta Connection. **(Contemporary Issues related to Topic)** | |
| **Unit II: ANALYSIS OF NETWORK** | **(7 Hrs.)** |
| Kirchhof's Laws, Current Division, Voltage Division, Nodal and Mesh Analysis of Electric Circuits, Superposition Theorem, Thevenin's Theorem. **(Contemporary Issues related to Topic)** | |
| **Unit III: TRANSFORMER AND MOTORS** | **(7 Hrs.)** |
| Introduction to Transformer, Construction, Working principle, Types of transformers, Introduction to DC Motor, Working Principle of DC Motor, Types of Motors. **(Contemporary Issues related to Topic)** | |
| **Unit IV: DIODE AND TRANSISTOR** | **(7 Hrs.)** |
| Introduction to Semiconductor, P-N junction diodes, Biasing & Characteristics of diodes. Diode Circuits - Half wave rectifier, full wave rectifier, bridge rectifier. Introduction to BJT- NPN and PNP, Modes of operation, Configuration and its Characteristics. **(Contemporary Issues related to Topic)** | |
| **Unit V: OPERATIONAL AMPLIFIER AND ITS APPLICATION** | **(7 Hrs.)** |
| Introduction to Op-Amp, Inverting and Non-Inverting Amplifier, Linear Applications of OP-AMP like adder, Subtractor, integrator, differentiator and non-linear application using Comparator. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Electronics Measurement** | **(7 Hrs.)** |
| Introduction to Measurement System, Generalized block diagram of Measurement System, Static & dynamic characteristics of measurement system, Types of errors & their sources, Statistical analysis. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **42 Hours** |

| Textbooks: | |
|---|---|
| 1. | Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford Higher Education, First Edition 2005 |
| 2. | Electronics Devices and circuits, Millman Jacob, McGraw Hill Education, Fourth Edition (2015) |
| 3. | Circuit Theory (Analysis and Synthesis) , by A. Chakrabarti, Dhanpat Rai & Co., Reprint Edition 2014 |

| Reference Books: | |
|---|---|
| 1. | OP-AMP and Linear Integrated Circuit, by Ramakant A. Gayakwad, Prentice Hall India Learnin Private Limited, Published in 2002 |
| 2. | Electrical & Electronic measurement & Instrument, A. K. Sawhney, Dhanpat Rai & Co.,18th edition 2008 |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| 1 | http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0 |
| 2 | https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042 |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://onlinecourses.nptel.ac.in/noc22_ee113/preview |

## I SEMESTER

## 22ET108 : Programming for Problem Solving

| **Course Outcomes :** |
|---|
| **On completion of this course, the student will be able to** |
| 1) Describe the basics of computer system components and operation, basics of algorithms and flowcharts (L2) |
| 2) Develop programs using conditional statements and loops user defined functions, and pointers.(L3) |
| 3) Analyze single and multi-dimensional arrays as a data structure and its use in problem solving.(L4) |
| 4) Describe the basics of Strings, Structures, Unions, and File handling and its use for problem solving.(L2) |

| **Unit I: Computer System Basics:** | **(6 Hrs.)** |
|---|---|
| Introduction to components of a computer system (disks, memory, processor), how program is executed, understanding of concepts such as operating system, compilers, source and object programs, etc. Introduction to algorithms and flowcharts.<br>**Basic building blocks of C:** Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, precedence of operators<br>**(Contemporary Issues related to Topic)** | |
| **Unit II:** | **(6 Hrs.)** |
| Expressions, sizeof() operator, constants, typedef statement, basic input/output statements and functions (scanf, printf, getch, putch, gets, puts ), Introduction to library functions, writing straight line programs.Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement.<br>**(Contemporary Issues related to Topic)** | |
| **Unit III: Loop Structures:** | **(6 Hrs.)** |
| While, do while and for loops, break and continue statement, "goto" statement, real life programming examples based on these loop structures, bitwise operators, real life programming examples.<br>**(Contemporary Issues related to Topic)** | |
| **Unit IV: Modular programming:** | **(7 Hrs.)** |
| Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value , C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, Concepts of a pointer, call by reference, types of programming errors, real life programming examples<br>**(Contemporary Issues related to Topic)** | |
| **Unit V: Arrays:** | **(7 Hrs.)** |
| One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting techniques – Bubble sort , and selection sort. Two-dimensional arrays: matrix representation, programs for basic matrix operations such as addition, multiplication and transpose, Array as function arguments. Strings: string representation and string handling functions, real life programming examples<br>**(Contemporary Issues related to Topic)** | |
| **Unit VI: Structure and Union, Concepts of files:** | **(7 Hrs.)** |
| Types of files, file opening in various modes, file opening and closing, fseek(), reading and writing text files, concept of pre-processor directives and macros, command line arguments, real life programming examples<br>**(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| Textbooks: | |
|---|---|
| 1. | Mastering C, K.R.Venugopal& S.R. Prasad, TMH,2007. |
| 2. | Programming in ANSI C, E. Balaguruswamy, Mc Graw Hill Education |
| 3. | The C Programming Language., J.B.W.Kernighan&D.M.Ritchie, Prentice Hall |

| Reference Books: | |
|---|---|
| 1. | Problem Solving And Program Design In C, Jeri. R. Hanly, Elliot B. Koffman, Pearson Education |
| 2. | Programming with C, Byron Gottfried, Schaum;s Outline Series |
| 3. | How to solve it by computers, R. G. Dromey, Prentice Hall India |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| 1 | http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/27.c.pdf |
| 2 | http://103.152.199.179/YCCE/DTEL%20Material/7.Information%20Technology/DTEL%20PPTs/11.ITCP_E_SSG.pdf |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://archive.nptel.ac.in/courses/106/104/106104128/ |

## I SEMESTER

## 22ET109 : Lab : Programming for Problem Solving

| **Course Outcomes** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1) Describe the basics of computer system components and operation, basics of algorithms and flowcharts (L2)<br>2) Develop programs using conditional statements and loops user defined functions, and pointers.(L3)<br>3) Analyze single and multi-dimensional arrays as a data structure and its use in problem solving.(L4)<br>4) Describe the basics of Strings, Structures, Unions, and File handling and its use for problem solving.(L2) |

| SN | **Experiments based on** |
|---|---|
| 1(A) | Introduction to Linux Operating system & it's different commands. |
| 1(B) | Introduction to Vi editor, Compilation and Execution of a program in Linux. |
| 2 | Practical based on Arithmetic and Conditional operators. |
| 3(A) | Practical based on Decision Control statements |
| 3(B) | Practical based on Case Control statements (switch) |
| 4 | Practical based on Looping Statements. (for/while/do-while) |
| 5 | Practical based on Functions and Recursion. |
| 6(A) | Practical based on 1-D Array. (Searching) |
| 6(B) | Practical based on 1-D Array. (Sorting) |
| 7 | Practical based on 2-D Array. |
| 8 | Practical based on Strings |
| 9 | Practical based on Structures. |
| 10 | Practical based on Files. |

## I SEMESTER

## Audit Course

## GE2131: Universal Human Value

| **Course Outcomes** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1.Experiential validation through the way to verify right or wrong.<br>2. Practice living in harmony with natural acceptance.<br>3. Realize the importance of relationships**.**<br>4. Recognize the importance of sustainable co-existence in existence. |

| **Unit I: Course Introduction Need, Basic Guidelines, Content and Process for Value Education** | **(4 Hrs.)** |
|---|---|
| Understanding the need, basic guidelines, content and process for Value Education<br>Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations | |
| **Unit II: Understanding Harmony in the Human Being - Harmony in Myself!** | **(4 Hrs.)** |
| Understanding human being as a co-existence of the sentient 'I' and the material 'Body'<br>Understanding the needs of Self ('I') and 'Body'<br>Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)<br>Understanding the characteristics and activities of 'I' and harmony in 'I' | |
| **Unit III: Understanding Harmony in the Family** | **(4 Hrs.)** |
| Understanding Harmony in the family – the basic unit of human interaction<br>Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship<br>Understanding the meaning of Vishwas; Difference between intention and competence<br>Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship | |
| **Unit IV: Understanding Harmony in the Society-** | **(4 Hrs.)** |
| Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and ,differentiation; the other salient values in relationship ,Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sahasttva as comprehensive Human Goals,Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhauma Vyavastha )- from family to world family! ,Practice Exercises and Case Studies will be taken up in Practice Sessions | |
| | |

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|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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| | |
|---|---|
| **Unit V: Understanding Harmony in the Nature -** | **(4Hrs)** |
| Whole existence as Co-existence, Understanding the harmony in the Nature Interconnectedness and mut Practice Exercises and Case Studies will be taken up in the Practice Sessions.ual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Practice Exercises and Case Studies will be taken up in the Practice Sessions. | |
| | |
| **Unit VI :Understanding Harmony in the Existence -** | **(4Hrs)** |
| Understanding Existence as Coexistence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence ,Practice Exercises and Case Studies will be taken up in the Practice Sessions. | |
| **Total Lecture** | **24 Hours** |

| **Textbooks:** | |
|---|---|
| **1.** | **The primary resource material for teaching this course consists of text book** A foundation course in Human Values and professional Ethics, Excel books, 1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria |

| **Reference Books:** | |
|---|---|
| **1.** | **The teacher's manual** A foundation course in Human Values and professional Ethics, Excel books,1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria |

# I SEMESTER
## Audit Course
## MLC2121: YCAP1-Get Set Go

| Objective | Outcomes |
|---|---|
| Get Set Go program is designed to introduce students to the real world. It gives them the skills they need to reach their goals and live up to their full potential at college, home and work. The program was developed with feedback from students; it consists of interactive sessions that include real-life scenarios and role-playing. It can help young adults become more confident and better able to cope with the pressure and stress they face. | The students gain more confidence and skills required to deal with the challenges they will face in college and at home. Their interpersonal and intrapersonal skills are enhanced pushing them to think towards their future and aim for their goals. |

**Syllabus Subject: Communication Skills – 1st Year, No. of hours - 18**

| Unit No. | Topic | Duration |
|---|---|---|
| 1 | Topic: Build a foundation for success - Explain the Importance of Process of improvement, stating your Name with Impact, Recall and Use Names, Name Remembering Formula o LIRA o PACE – Individual Activity o BRAMMS o Chaining Method, Introduce "My Vision | 2.5 Hours |
| 2 | Topic: Communication Fundamentals for Building Trust- Be a good listener, use conversation links, show genuine interest Hi-Five of Success ♣ Build on Memory Skills and Enhance Relationships ♣ PEG words ♣ Explain Permanent PEG Memory System, energize our Communications – Explain 3Vs of communication – Visual-Vocal-Verbal | 3.5 Hours |
| | Practice Conversations, Activity – Pause-Part-Punch, Group Activity | |

| Unit No. | Topic | Duration |
|---|---|---|
| 3 | Topic: Increase Self Confidence -• Use our experiences to communicate more confidently • Communicate with clarity and conciseness • Discover how past experiences influence behavior | 2.5 Hours |
| 4 | Topic: Motivate Others and Enhance Relationships-• Learning Objectives • Explain Gain Willing Cooperation Principles • Group Presentation • Explain Demonstration of Leadership Principles • Explain "Evidence" critical in establishing credibility | 4 Hours |
| | Individual Activity – Sharing of defining moment, Skit to demonstrate Leadership Principles, Stranded on Island | |

| Unit No. | Topic | Duration |
|---|---|---|
| 5 | Topic: Fundamentals of Communication (Earn the right – Excite -Eagerness) ♣ Elevator Pitch ♣ Develop more Flexibility, ♣ Recap and Summarize | 3.5 Hours |
| 6 | Activities - – Individual Presentation, Flexibility Drills, Individual Presentations – My Vision Assignment | 2 Hours |

**Reference Books:**

1. How to win friends & influence people – Dale Carnegie

Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

*(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)*

**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110


# Bachelor of Technology

# SoE & Syllabus 2022

## 2nd Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's

**Yeshwantrao Chavan College of Engineering**

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **FIRST SEMESTER** | | | | | | | | | | | | | | | |
| 1 | 1 | BS | GE/MTH | 22ET101 | Differential and Integral Calculus | T | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hrs |
| 2 | 1 | BS | GE/CHE | 22ET102 | Engineering Chemistry | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 3 | 1 | BS | GE/CHE | 22ET103 | Lab: Engineering Chemistry | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 4 | 1 | HS | GE/HUM | 22ET104 | Professional Communication | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 5 | 1 | BES | CV/CV | 22ET105 | Engineering Mechanics | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 6 | 1 | BES | CV/CV | 22ET106 | Lab: Engineering Mechanics | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 1 | BES | EE/EE | 22ET107 | Basic Electrical and Electronics Engineering | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 8 | 1 | BES | IT/IT | 22ET108 | Programming for Problem Solving | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 9 | 1 | BES | IT/IT | 22ET109 | Lab: Programming for Problem Solving | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | | **TOTAL** | **18** | **1** | **6** | **25** | **22** | | | | |
| **List of Mandetory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 1 | HS | GE/HUM | GE2131 | Universal Human Value | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 1 | HS | GE/T&P | MLC2121 | YCAP1-Get Set Go | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SECOND SEMESTER** | | | | | | | | | | | | | | | |
| 1 | 2 | BS | GE/MTH | 22ET201 | Differential Equation, Complex Variables & Matrices | T | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hrs |
| 2 | 2 | BS | GE/PHY | 22ET202 | Engineering Physics | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 3 | 2 | BS | GE/PHY | 22ET203 | Lab: Engineering Physics | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 4 | 2 | HS | GE/HUM | 22ET204 | Social Science | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 5 | 2 | BES | ME/ME | 22ET205 | Engineering Graphics | T | 1 | 0 | 0 | 1 | 1 | 30 | 20 | 50 | 3 Hrs |
| 6 | 2 | BES | ME/ME | 22ET206 | Lab: Engineering Graphics | P | 0 | 0 | 4 | 4 | 2 | | 60 | 40 | |
| 7 | 2 | BES | CT/CT | 22ET207 | Elements of AIML | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 8 | 2 | BES | EL/EL | 22ET208 | Electrical workshop | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 9 | 2 | BES | ET/ET | 22ET209 | Digital Logic Design | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| 10 | 2 | BES | ET/ET | 22ET210 | Lab: Digital Logic Design | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | | **TOTAL** | **16** | **1** | **10** | **27** | **22** | | | | |
| **List of Mandetory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 2 | HS | GE/T&P | MLC2122 | YCAP2 -Functional English | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 2 | BES | GE/CHE | GE2132 | Environmental Science | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

**MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2022** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

## II SEMESTER

## 22ET201: Differential Equation, Complex Variables & Matrices

| Course Outcomes |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Use appropriate Methods to solve first order and higher order differential equations and apply it to find solutions of engineering problems.<br>2. Determine the various functions of complex numbers.<br>3. Evaluate the integration of function of complex variables.<br>4. Use Matrix method to solve system of linear equations, evaluate eigen values - eigen vectors and its applications. |

| **Unit I: Differential Equations I** | **(7 Hrs.)** |
|---|---|
| Linear differential equations of first order and first degree, Differential equation reducible to linear form, Exact differential equations (excluding the case of integrating factor) and their applications to various fields. **(Contemporary Issues related to Topic)** | |
| **Unit II: Differential Equations II** | **(7 Hrs.)** |
| Higher order linear differential equations with constant coefficients, Complementary functions and Particular Integral for different cases, Method of variation of parameters, Examples on application to various fields. **(Contemporary Issues related to Topic)** | |
| **Unit III: Differential Equations III** | **(6 Hrs.)** |
| Cauchy's homogeneous linear differential equations, Legendre's linear differential equation, Applications of differential equations to various field (only up to second order). **(Contemporary Issues related to Topic)** | |
| **Unit IV: Complex Numbers** | **(6 Hrs.)** |
| Basic concepts of complex numbers and its various forms. Separation of real and imaginary parts, De Moivre's theorem, Application of De Moivre's theorem, Exponential function of complex numbers, Circular function of complex numbers, Hyperbolic functions and their inverse, Logarithm of a complex number. **(Contemporary Issues related to Topic)** | |
| **Unit V: Complex Variables** | **(7 Hrs.)** |
| Analytic function, Cauchy-Riemann conditions, Harmonic functions, Finding Harmonic conjugates, Taylor's and Laurent's Theorem (statement only), Examples on Taylor's and Laurent's Theorem, Evaluation integral by using Residue theorem. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Matrices** | **(6 Hrs.)** |
| Rank of a matrix, Consistency of system of equations using rank, Characteristics equations, Eigen values and Eigen vectors, Cayley Hamilton Theorem (without proof) statement and verification, Sylvester's theorem- statement and its application. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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| Textbooks: | |
|---|---|
| 1. | Erwin Kreyzig, Advance Engineering Mathematics, 6th Edition, John Wiley and Sons, INC. |
| 2. | H.K. Dass, Engineering Mathematics, 11th revised edition, S. Chand, Delhi. |
| 3. | H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi. |
| 4. | Dr. B.S. Grewal, Higher Engineering Mathematics, 42th edition, Khanna Publishers. |
| 5. | P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan. |

| Reference Books: | |
|---|---|
| 1. | G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999. |
| 2. | N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10th edition, Laxmi Prakashan. |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| 1 | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/ |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://nptel.ac.in/courses/111103070 |
| 2. | https://onlinecourses.nptel.ac.in/noc19_ma28/preview |
| 3. | https://nptel.ac.in/courses/111/106/111106100/ |

## II SEMESTER

## 22ET202: Engineering Physics

**Course Outcomes :**

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

1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particle.
2. Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Examine the intensity variation of light due to interference, diffraction, laser and its applications.
4. Analyze the motion of charged particle in electric and magnetic field and its applications to electron optic devices.
5. Illustrate the nature and characterization of magnetic materials and superconductors for engineering applications.

| | |
|---|---|
| **Unit I: Quantum Physics** | **(7 Hrs.)** |
| Wave-particle duality, de-Broglie hypothesis, Wavepacket, Heisenberg uncertainty principle: Significance, Applications. Wavefunction and its probability interpretation, Schrodinger Equation, Particle in infinite potential well, quantum tunnelling. **(Contemporary Issues related to Topic)** | |
| **Unit II: Band Theory of Solids** | **7 Hrs.)** |
| Formation of energy bands in solids; Classification of solids, Energy band diagram of Si/Ge, Intrinsic and extrinsic semiconductors, Conductivity, Law of mass action, Fermi function, Fermi level in intrinsic and extrinsic semiconductors, Dependence of Fermi level on impurity concentration and temperature, Hall effect. **(Contemporary Issues related to Topic)** | |
| **Unit III: Geometrical Optics** | **(7 Hrs.)** |
| Interference: Interference in thin films, Wedge shaped film, Newton's rings, Applications of interference Diffraction: Fraunhofer diffraction from a single slit. **(Contemporary Issues related to Topic)** | |
| **Unit IV: Laser** | **(6 Hrs.)** |
| Interaction of radiation with matter/ quantum processes, Population Inversion and Optical resonance cavity, Three and four level laser, Ruby laser, Semiconductor diode laser, Properties and engineering applications of laser. **(Contemporary Issues related to Topic)** | |
| **Unit V: Electron Ballistics** | **(7 Hrs.)** |
| Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens, CRO and its applications. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Magnetic Materials & Superconductors** | **(6 Hrs.)** |
| Introduction to magnetic materials, interpretation of Hysteresis curves, Superconductors: Type-I and Type-II, Meissner effect, Applications. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **40 Hours** |

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| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| **Textbooks:** | |
|---|---|
| 1. | M. N. Avadhanulu, P.G.Kshirsagar, A Textbook of Engg. Physics, S.Chand and Company. |
| 2. | Hitendra K Malik , A K Singh , Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited, 2015. |

| **Reference Books:** | |
|---|---|
| 1. | David Halliday, Robert Resnick and Jerle Walker, John-Wiley India, Fundamentals of Physics, 10th John Wiley & Sons Inc. |
| 2. | Brijlal and Subramanyam, Text Book of Optics, Revised edition, S. Chand and Company. |
| 3. | M.N. Avadhanulu, 2nd Edition, Laser, S.Chand and Company. |
| 4. | A. Beiser, Concept of Modern Physics, 6th Edition, Laser, Tata McGraw-Hill. |
| 5. | Thyagarajan K. and Ghatak A.K, LASERS: Theory and Applications, 2nd Edition, Macmillan Publication. |
| 6. | S.O.Pillai, Solid State Physics, 9th Edition, New Edge International Publishers. |
| 7. | Palanisamy, Solid State Physics, 8th Edition, New Edge International Publishers. |
| 8. | C. Kittel, Solid State Physics, 8th Edition, Willey Publication. |
| 9. | B. K. Pandey, S. Chaturvedi, Engineering Physics, 1st Edition, Cengage Learning. |
| 10. | John Allision, Electronic Engineering Materials and Devices, TMH edition, 10th reprint, Tata McGraw Hill. |

| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
|---|---|
| 1 | chrome- http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/Eisberg%20&%20Resnick%20-%20Quantum%20Physics.pdf |
| 2 | chrome- http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/2016_Book_ThePhysicsOfSemiconductors.pdf |
| 3 | chrome- http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/Dekker%20-%20Solid%20State%20Physics.pdf |

| **MOOCs Links and additional reading, learning, video material** | |
|---|---|
| 1. | https://youtu.be/jaXiOXnJd8s |
| 2. | https://youtu.be/v2zpSFEdvZo |
| 3. | https://youtu.be/tjUUU9f2Wpc |
| 4. | https://youtu.be/qcE2Wcpm05k |

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| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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## II SEMESTER

## 22ET203: Lab: Engineering Physics

| Course Outcomes |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particle.<br>2. Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.<br>3. Examine the intensity variation of light due to interference, diffraction, laser and its applications.<br>4. Analyze the motion of charged particle in electric and magnetic field and its applications to electron optic devices.<br>5. Illustrate the nature and characterization of magnetic materials and superconductors for engineering applications. |

**Minimum Eight Practical's to be performed from the list as below**

| SN | Experiments based on |
|---|---|
| 1 | Determination of Planck's constant. |
| 2 | Study of Tunnel Diode. |
| 3 | Determination of Hall coefficient and density of charge carriers using Hall effect. |
| 4 | Dependence of Hall coefficient on temperature. |
| 5 | Determination of Band gap in a semiconductor by four probe method. |
| 6 | Determination of Band gap in a semiconductor using reverse biased p-n diode. |
| 7 | Determination of radius of curvature of Plano convex lens using Newton's rings. |
| 8 | Determination of thickness of thin paper using air wedge. |
| 9 | Determination of wavelength of sodium light using diffraction grating |
| 10 | Determination of wavelength of laser using diffraction grating. |
| 11 | Determination of divergence of laser beam. |
| 12. | Determination of amplitude and frequency of sinusoidal signal using C.R.O. |
| 13. | To measure the phase shift introduced by a phase shift network using Dual beam CRO. |

## II SEMESTER
## 22ET204: Social Science

| Course Outcomes |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Explain the basic concepts of social sciences. |
| 2. Describe the development of various Civilizations and their culture. |
| 3. Explain the basic idea of Constitution of India and aware about their rights & Duties. |
| 4. Analyze the Impact of Industrialization on Society and discuss the Fundamental Concepts of Society. |

| | |
|---|---|
| **Unit I: Social Sciences & Its Utility** | **(6 Hrs.)** |
| Meaning & Scope of Social Science, General Utility of Social Sciences to Engineers, Applied Humanities, Social Engineering, Society its types & Characteristics. **(Contemporary Issues related to Topic)** | |
| **Unit II: Human Civilization** | **(7 Hrs.)** |
| Development of human civilization with specific reference to monumental studies of engineering skill, Ancient Indian Civilization:- a) Indus Valley Civilization b) Vedic Civilization, c) Indian Art & Architecture. **(Contemporary Issues related to Topic)** | |
| **Unit III: Fundamental Concept in Social Science** | **(7 Hrs.)** |
| Social Structure and Social System, Socialization, Social Control and Social Change, Culture: Characteristics and Features. **(Contemporary Issues related to Topic)** | |
| **Unit IV: Introduction to Constitution of India** | **(7 Hrs.)** |
| Significance of Preamble, Fundamental Rights and Duties, Directive principles of state policy. Federal System Concept of industrial Democracy. **(Contemporary Issues related to Topic)** | |
| **Unit V: Industrial Organization & Society** | **(6 Hrs.)** |
| Industrialization and its impact on society, Selection, Training & Motivation of workers, Industrial Psychology, Industrial sociology, Work Organization, Power, Authority and Status system. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Industrial Management** | **(6 Hrs.)** |
| Labour Union Organization, Discipline in Industry, Labour Turnover, Industrial Fatigue of workers, Health and Safety of Workers. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| **Textbooks:** | |
|---|---|
| 1. | S. Shabbir & Sheikh, A New Look Into Social Sciences, S.Chand , New Delhi,1993. |
| 2. | C N Shankar Rao, Sociology Principles of Sociology With An Introduction To Social Thought, S. Chand, New Delhi, 2010. |
| 3. | O P Khanna, Industrial Engineering And Management, Dhanpat Rai Publication, New Delhi, 2010. |
| 4. | Dr. G. N. Nimbarte, Social Science, Sankalp Publications, Nagpur. |

| **Reference Books:** | |
|---|---|
| 1. | C. N. Shankar Rao, Sociology: Principal of Sociology with an introduction to social thought, Publication: S. Chand, New Delhi. |
| 2. | O. P. Khanna, Industrial Engineering and Management, Dhanpat Rai Publication, New Delhi. |
| 3. | Reader's Digest Vanished Civilizations, The Reader's Digest Association Limited, New York. |
| 4. | Constitution of India: Dr B. R. Ambedkar: Government of India, Government of India. |
| 5. | B. L. Kayastha, Recent trends in Humanities and Social Sciences, 1st Ed., Akinik Publications, New Delhi. |

| **MOOCs Links and additional reading, learning, video material** | |
|---|---|
| 1. | https://mobidrive.com/sharelink/r/4I2bDsxN9YrVI03vMZaInJ5VBpojBmR9EqKv7nin9pkN |
| 2. | https://mobidrive.com/sharelink/r/4I2bDsxN9YrVI03vMZaInJ2sUn37wK4V3CpGhemYRKnz |

## II SEMESTER

## 22ET205: Engineering Graphics

| Course Outcomes : |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Construct orthographic drawing and isometric drawing of a given object |
| 2. Evaluate Projections of various One Dimensional, Two dimensional, Three dimensional objects |
| 3. Develop the lateral surfaces of various solids, their section and intersection**.** |
| 4. Practice the use of software tools used for Two dimensional drawings. |

| | |
|---|---|
| **Unit I: Theory of Orthographic Projections:** | **(3 Hrs.)** |
| Introduction, Quadrant system, Theory of orthographic projection, Projection method and principal planes, First and Third angle projections **(Contemporary Issues related to Topic)** | |
| **Unit II: Theory of Isometric Projections:** | **(2 Hrs.)** |
| Theory of isometric projection, Method for drawing isometric views, Different problems on isometric projections. **(Contemporary Issues related to Topic)** | |
| **Unit III: Lines:** | **(2 Hrs.)** |
| Projection of points, Projection of lines, True lengths and inclinations, apparent lengths and inclinations, various positions of lines in different quadrants, Traces of lines, projection of line on auxiliary plane. **(Contemporary Issues related to Topic)** | |
| **Unit IV: Planes and Solids:** | **(4 Hrs.)** |
| Projection planes: (Polygonal Lamina, Circular Lamina), Projection of Perpendicular planes and oblique planes. Auxiliary views (Auxiliary planes) Projection of Solids :(Inclined to One Plane Only) - Polyhedra (Regular and Irregular Polyhedra), Solids of Revolution **(Contemporary Issues related to Topic)** | |
| **Unit V: Section of Solids and Development of Surfaces:** | **(2 Hrs.)** |
| Types of Section planes, Sectional top view, True shape.<br>Development of different solids using Radial line and parallel line methods. **(Contemporary Issues related to Topic)** | |
| **Unit VI: Intersection of Surfaces of solids:** | **(2 Hrs.)** |
| Intersection between similar solids, Intersection between dissimilar solids, Lines and Curves of Intersection. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **15 Hours** |

| | | | | | |
|---|---|---|---|---|---|
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| Textbooks: | |
|---|---|
| 1. | D.M. Kulkarni, A. P. Rastogi and A. K. Sarkar , Engineering Graphics with AutoCAD PHI learning Pvt. Ltd., Revised Edition(2014), |
| 2. | N. D. Bhatt ,Engineering Drawing Charotar Publishing House Pvt. Ltd, 53 rd Edition 2017 |

| Reference Books: | |
|---|---|
| 1. | D. A. Jolhe Engineering Drawing , Tata McGraw Hill Publications , 2008, |
| 2. | K. L. Narayana & P. Kannaiah , Engineering Drawing SciTech Publication , 2010 |
| 3. | R. K. Dhawan Engineering Drawing S. Chand Publication Multicolor revised edition 2015 |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| 1 | Intranet on address 172.16.1.10. data/CCC/software / AutoCAD Software Setup. |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| 1. | https://youtube.com/playlist?list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz |
| 2. | https://nptel.ac.in/courses/112105294 |

## II SEMESTER

## 22ET206 : Lab : Engineering Graphics

| Course Outcomes |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Construct orthographic drawing and isometric drawing of a given object |
| 2. Evaluate Projections of various One Dimensional, Two dimensional, Three dimensional objects |
| 3. Develop the lateral surfaces of various solids, their section and intersection. |
| 4. Practice the use of software tools used for Two dimensional drawings. |

**Practical's to be performed from the list as below**

| SN | Experiments based on | No.of Practical's |
|---|---|---|
| 1 | Introduction of AutoCAD Basic Commands | 02 |
| 2 | Orthographic Projection | 03 |
| 3 | Isometric Projection | 03 |
| 4 | Projection of Straight Line | 03 |
| 5 | Projection of Planar Surface | 03 |
| 6 | Projection of Solid | 03 |
| 7 | Section and Development of Solid | 04 |
| 8 | Intersection of Surfaces | 03 |
| 9 | Drawing Sheet 1: Convention for various lines, Dimensioning and Orthographic Projection | 02 |
| 10 | Drawing Sheet 2: Projection of line, planar surface or solid. (Any one) | 02 |
| | **Total Practical's** | **28 Hours** |

## II SEMESTER
## 22ET207: Elements of AIML

| **Course Outcomes :** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Develop an understanding what is involved in AIML.<br>2. Understand learning algorithms of AIML.<br>3. Understand the deep learning.<br>4. Apply the knowledge for the selection of tool and languages for problem solving<br>5. Understand the use of AIML for real world problems. |

| **Unit I: Introduction to Artificial Intelligence** | **(7 Hrs.)** |
|---|---|
| What Is Artificial Intelligence? History, AI and Society, Agents and Knowledge based systems, Components of AI **(Contemporary Issues related to Topic)** | |
| **Unit II: Propositional Logic** | **(7 Hrs.)** |
| Propositional Logic, First order logic, limitations of logic, Search, Games and Problem Solving, Reasoning with Uncertainty **(Contemporary Issues related to Topic)** | |
| **Unit III: Machine Learning** | **(7 Hrs.)** |
| Supervised learning, Unsupervised learning, Reinforcement learning: Model based learning, Regression, Decision trees, Linear Discrimination, Kernel Machines and Graphical Models **(Contemporary Issues related to Topic)** | |
| **Unit IV: Artificial Neural Networks and Deep Learning** | **(7 Hrs.)** |
| Biological neural network, Artificial neural network, Hopfield network, Neural Associative memory, Linear networks, Backpropogation algorithm, Support Vector Machines, Basics of deep learning. **(Contemporary Issues related to Topic)** | |
| **Unit V: Introduction to Platforms, Tools, Frameworks and languages for AIML** | **(6 Hrs.)** |
| Top AIML Softwares: Salesforce Einstein, IBM Watson, Deep Vision, Cloud Machine Learning Engine, Azure Machine Learning Studio, Nvidia Deep Learning AI, Playment; Machine learning tools: TensorFlow, Amazon Machine Learning, Accord.NET, Apache Mahout, Shogun; Programming languages: Python, R, Java, Julia, C/C++, Others: Scikit Learn, Theano, Caffe, MxNet, Keras, PyTorch, CNTK, Auto ML, OpenNN, H20: Open Source AI Platform, Google ML Kit **(Contemporary Issues related to Topic)** | |
| **Unit VI: Applications of AI and ML** | **(6 Hrs.)** |
| Working with software based AI Applications, Working with AI in hardware Applications, Health, Banking and Finance, Automobile, Surveillance, Social Media, Education, Space, etc. **(Contemporary Issues related to Topic)** | |
| **Total Lecture** | **40 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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| **Textbooks:** | |
|---|---|
| 1. | Wolfgang Ertel, "Introduction to Artificial Intelligence" 2nd Edition, UTiCS, Springer |
| 2. | Ethem Alpaydın ,"Introduction to Machine Learning" 3rd Edition,The MIT Press, Cambridge, Massachusetts London, England. |

| **Reference Books:** | |
|---|---|
| 1. | John Paul Mueller, Luca Massaron John Wiley & Sons ,"Artificial Intelligence for Dummies" First, 2018 |
| 2. | Steven W. Knox,Wiley" Machine Learning A Concise Introduction" First, 2018 |

| **MOOCs Links and additional reading, learning, video material** | |
|---|---|
| 1. | https://www.youtube.com/watch?v=kwSTs0QVRfU |
| 2. | https://www.youtube.com/watch?v=GHpchgLoDvI&list=PLp6ek2hDcoNB_YJCruBFjhF79f5ZHyBuz |
| 3. | https://nptel.ac.in/courses/106105077 |

## II SEMESTER

## 22ET208: Electrical workshop

| Course Outcomes: |
|---|
| **Upon successful completion of the course the students will be able** |
| 1. To choose the electrical and electronics components/equipment for various application |
| 2. To select various sensors and measuring instruments for different applications. |
| 3. To build the various electrical wiring for different application |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Introduction of Tools, Electrical Materials and Electrical Drawing Symbols |
| 2 | Introduction to basic Electrical Components (R,L,C) with its number and color coding. |
| 3 | Introduction to Different types of Measuring Instruments and its demonstration. |
| 4 | One Lamp Controlled by One Switch and Distribution Board Connection |
| 5 | Staircase Wiring, Hospital Wiring and Godown Wiring |
| 6 | Master Switch Control Wiring and Intermediate Switch Wiring |
| 7 | Design of House Wiring |
| 8 | Introduction to Different sensor devices and its demonstration. |
| 9 | To Study different protection devices and Importance of Earthing. |
| 10 | To Study Circuit and Working of Home Inverter, UPS. |

## II SEMESTER

## 22ET209: Digital Logic Design

| Course Outcomes: |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Represent the data numerically and detect and correct errors. |
| 2. Develop the properties of partially ordered sets and lattices. |
| 3. Simplify the logical functions using minimization techniques. |
| 4. Design and analyse combinational Circuits |
| 5. Design and analyse sequential Circuits and sequential machines. |

| | | |
|---|---|---|
| **Unit:1** | **Number system , codes, sets, relations and lattices** | **5 Hours** |
| Number systems ,Binary codes , Error detection and correction, Introduction to :sets, relations, and lattices **(Contemporary Issues related to Topic)** | | |
| **Unit:2** | **Switching algebra and its applications** | **5 Hours** |
| Switching algebra , Switching functions , Isomorphic systems , Electronic-gate network, Electronic-gate networks, Boolean algebras **(Contemporary Issues related to Topic)** | | |
| **Unit:3** | **Minimization of switching functions** | **6 Hours** |
| Introduction , The map method , Minimal functions and their properties , The tabulation procedure for the determination of prime implicants , The prime implicant chart , Map-entered variables , Heuristic two-level circuit minimization , Multi-output two-level circuit minimization **(Contemporary Issues related to Topic)** | | |
| **Unit:4** | **Logic design** | **7 Hours** |
| Logic design , Design with basic logic gates , Logic design with integrated circuits , NAND and NOR circuits , Design of high-speed adders , Metal-oxide semiconductor (MOS) transistor **(Contemporary Issues related to Topic)** | | |
| **Unit:5** | **Introduction to synchronous sequential circuits and iterative networks** | **7 Hours** |
| Introduction to synchronous sequential circuits and iterative networks , Sequential circuits – introductory example , The finite-state model – basic definitions , Memory elements and their excitation functions , Synthesis of synchronous sequential circuits , An example of a computing machine , Iterative networks **(Contemporary Issues related to Topic)** | | |
| **Unit :6** | **Capabilities, minimization, and transformation of sequential machines** | **6 Hours** |
| The finite-state model – further definitions ,Capabilities and limitations of finite-state machines ,State equivalence and machine minimization ,Simplification of incompletely specified machines , **(Contemporary Issues related to Topic)** | | |
| | | |
| **Total Lecture Hours** | | **36 Hours** |

| | |
|---|---|
| **Textbooks** | |
| **1** | Zvi Kohavi, Niraj K. Jha, Switching & Finite Automata Theory, 3rd Edition, 2010, Cambridge University Press. |
| **Reference Books** | |
| **1** | R.P Jain , Modern Digital Electronics, Tata McGraw Hill,3rd Edition |
| **2** | Morris Mano, Digital Design, 3rd edition, 2005, Pearson. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20logic%20Design-%20Morris%20Mano%20(mcsbzu.blogspot.com)-1.pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital-Circuits-Anand-Kumar%20old%20edition-%20By%20EasyEngineering.net.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://onlinecourses.nptel.ac.in/noc21_ee75 |

## II SEMESTER

## 22ET210: Lab: Digital Logic Design

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Represent the data numerically and detect and correct errors. |
| 2. Develop the properties of partially ordered sets and lattices. |
| 3. Simplify the logical functions using minimization techniques. |
| 4. Design and analyse combinational Circuits |
| 5. Design and analyse sequential Circuits and sequential machines. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Implement basic gates using universal gates |
| 2 | Implement and verify truth table of Half and Full Adder. |
| 3 | Verify Binary to Gray conversion using XOR gates only. |
| 4 | Design a combinational circuit to produce the 2's complement of a 4-bit binary number |
| 5 | Realize the given function F=∑m (0,1,2,3,4,10,11,14,15 ) using 8:1 Multiplexer. |
| 6 | Verify the truth table of 3:8 decoder using IC74138 |
| 7 | Verify the truth table of SR flip-flop. |
| 8 | Verify the truth table of JK JK flip-flop. |
| 9 | Design of 4 bit Shift Registers |
| 10 | Design of MOD-9 Asynchronous counter |
| 11 | Design of state machine |
| 12 | Mini project |

# II SEMESTER
# Audit Course
# MLC2122: YCAP2 -Functional English

| | | |
|---|---|---|
| MLC2122<br>YCAP-II | **No of Evaluations** | **Result of successful completion of YCAP II shall be calculated based on the basis of evaluations.**<br><br>**To pass the exam a students must score 50% marks** |
| Evaluation Scheme | EVAL-I | |
| | 100 marks | |

| Objective | Objective |
|---|---|
| The aim of this course is to get the students to a common level in spoken English. The majority of the target group is expected to know English as a foreign/official language. Thus the objective of the course is to make the students comfortable in using it as a spoken language when the situation demands | Students will heighten their awareness of correct usage of English grammar in writing and speaking. |

**Syllabus Subject: Functional English – 2nd Sem , No. of hours - 20**

| Unit No. | Topic | Duration |
|---|---|---|
| 1 | Introduction to Functional English - What is FE? And Areas of application.<br>Basic Interactive sentences - Greetings & Replies, Asking for information, Telling people what you do, Asking somebody's opinion, Giving your opinion, Saying someone is correct, Saying that someone is wrong, Apologizing, Praising someone's work, Saying goodbye | 2 hours |
| 2 | Introduction & Basics of Common Expressions – Offer, Request, Gratitude, Apology<br>Modal Verbs - Words used often : Can- could, Will – would, Shall – should, Ought to-Must, May-might | 2 hours |
| | Practice exercises, Practice Conversations, Script Activity | 1.5 Hours |
| | Quiz on the above Topics, Exercises for Evaluation | 0.5 Hours |

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|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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| Unit No. | Topic | Duration |
|---|---|---|
| 3 | Topic: Internet & Social Media Communication<br>Introduction & Basics to Social Networking, Texting & Instant messaging,<br>Blogs & Discussion Board- discussion with examples, Ethics of Social media & communication | 3 Hours |
| | Topic: Introduction to Creative Ads Why Ads, Whats in it for me?, Characteristics of ads, Assignment | |
| 4 | Topic: Tenses -1<br>Introduction & Basics, Simple Tense (Past, Present, Future), Continuous Tense (Past, Present, Future) – discussion with examples | 4 Hours |
| | Assignment Presentation on Mad Ads, Quiz on Tenses and Social Media-Internet Communication | |

| Unit No. | Topic | Duration |
|---|---|---|
| 5 | Topic: Tenses -2<br>Introduction & Basics, Perfect Tense (Past, Present, Future), Perfect Continuous Tense (Past, Present, Future) – discussion with examples | 3.5 Hours |
| | Topic: Introduction to Movie Magic<br>Learn English with films, Film Vocabulary, Describing a film, Types of Films, | |
| 6 | Topic: Written Communciation<br>Introduction & Basics of Writing, Five methods of communication, Mind your grammar, Commonly confusing words<br>Letters – Format, Parts of a business letter, When does communication fail?, Things to remember, Positive language not negative language, Active voice not passive voice<br>Effective emailing -How to make an effective e-mail, Few common e-mail habits that cause problems, Parts of an e-mail, Some other important aspects | 3.5 Hours |
| | Assessment – Letter and Email Writing, Tenses - Quiz | |

| **Reference Books:** | |
|---|---|
| 1. | Soft Skills and Professional Communication, Francis Peters SJ, Mcgraw Hill Education |
| 2. | Bringing out the best in People, Aubrey Daniels, Mcgraw Hill |

| **MOOCs Links and additional reading, learning, video material** | |
|---|---|
| 1. | https://www.youtube.com/channel/UCLsI5-B3rIr27hmKqE8hi4w |
| 2. | https://www.youtube.com/channel/UC1Y1I4shF84scQ4HBThahcg |

| | | | | | |
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| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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## II SEMESTER
## Audit Course
## GE2132 : Environmental Science

**Course Outcome :**

**Upon successful completion of the course the students will be able**

To understand the basic concepts and problems and follow sustainable development practices

To enhance knowledge skills and attitude towards environment

To understand natural environment and its relationship with human activities.

To evaluate local, regional and global environmental topics related to resource use and management.

| **Unit I: : Introduction** | **(2Hrs.)** |
|---|---|
| Definition, scope and importance; Need for public awareness – institutions in environment, people in environment. | |

| **Unit II: : Natural Resources** | **(2 Hrs.)** |
|---|---|
| Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles. | |

| **Unit III: Ecosystems** | **(4 Hrs.)** |
|---|---|
| Concept of an ecosystem – understanding ecosystems, ecosystem degradation, resource utilization. Structure and functions of an ecosystem – producers, consumers and decomposers.<br>Energy flow in the ecosystem – water, carbon, oxygen, nitrogen and energy cycles, integration of cycles in nature.<br>Ecological succession; Food chains, food webs and ecological pyramids; Ecosystem types – characteristic features, structure and functions of forest, grassland, desert and aquatic ecosystems. | |

| **Unit IV: Bio-diversity** | **(4 Hrs.)** |
|---|---|
| Introduction – biodiversity at genetic, species and ecosystem levels Bio-geographic classification of India. Value of biodiversity – Consumptive use value, productive use value, social, ethical, moral, aesthetic and optional vlue of biodiversity.<br>India as a mega-diversity nation; hotspots of biodiversity.Threats to bio-diversity – habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India. Insitu and Exsitu conservation of biodiversity. Role of individual and institutions in prevention of pollution.Disaster management – Floods, earthquake, cyclone, landslides. | |

| **Unit V: Pollution** | **(4 Hrs.)** |
|---|---|
| Definition; Causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. Solid waste management – Causes, effects and control measures of urban and industrial waste. | |

| | | | | | |
|---|---|---|---|---|---|
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| **Unit VI: Social Issues and the Environment** | **(4 Hrs.)** |
|---|---|
| Unsustainable to sustainable development; Urban problems related to energy; Water conservation, rainwater harvesting, watershed management; Problems and concerns of resettlement and rehabilitation of affected people.<br>Environmental ethics – issues and possible solutions – Resource consumption patterns and need for equitable utilization; Equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender equity.<br>Preserving resources for future generations. Te rights of animals; Ethical basis of environment education and awareness; Conservation ethics and traditional value systems of India.<br>Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocasts.<br>Wasteland Reclamation; Consumerism and Waste products.<br>Environment legislations – The Environment (Protection) Act; The water (Prevention and Control of Pollution) Act; The Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations – environment impact assessment (EIA), Citizens actions and action groups.<br>Public awareness – Using an environmental calendar of activities, self-initiation. | |
| **Unit VII : Human Population and the Environment** | **(4Hrs.)** |
| Global population growth, variation among nations. Population explosion; Family Welfare Programmes – methods of sterilization; Urbanization.<br>Environment and human health – Climate and health, infectious diseases, water-related diseases, risk due to chemicals in food, Cancer and environment.<br>Human rights – equity, Nutrition and health rights, Intellectual property rights (IPRS), Community Biodiverstity registers (CBRs).<br>Value education – environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation.<br>HIV / AIDS; Women and Child Welfare; Information technology in environment and human health. | |
| **Total Lecture** | **24 Hours** |

| **Textbooks:** | |
|---|---|
| 1. | Perspectives in environmental studies by A. Kaushik and C. P. Kaushik. |
| 2. | Textbook for Environmental studies by Erach Bharucha for UGC |
| 3. | Textbook of Environmental studies by Shanta Satyanarayan, Dr. Suresh Zade,<br>Dr. Shashikant Sitre & Dr. Pravin Meshram. |
| 4. | Fundamental concepts in Environmental studies by Dr. D.D. Mishra. S. Chand publications |

| **Reference Books:** | |
|---|---|
| 1. | Essentials of Ecology and Environmental Science by Dr. S .V .S. Rana,PHI Learning Pvt. Ltd, Delhi |
| 2. | Environmental Chemistry by Anil Kumar De, Wiley Eastern Limited |
| 3. | Environmental Science by T.G. Miller, Wadsworth Publishing Co, 13th edition. |
| 4. | Ecology and Environment by P. D. Sharma, Rastogi publications |

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|---|---|---|---|---|---|
| | | | July 2022 | 1.00 | Applicable for AY 2022-23 Onwards |
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Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

*(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)*

**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110


# Bachelor of Technology

# SoE & Syllabus 2022

## 3rd Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's

**Yeshwantrao Chavan College of Engineering**

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Third Semester** | | | | | | | | | | | | | | | |
| 1 | 3 | BS | ET/ET | 22ET301 | Signals & Systems | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 3 | BS | ET/ET | 22ET302 | Lab:Signals & Systems | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 3 | 3 | HS | GE/HUM | 22ET303 | Fundamentals of Management and Economics | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 3 | PC | ET/ET | 22ET304 | Electronic Devices and Circuits | **T** | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hours |
| 5 | 3 | PC | ET/ET | 22ET305 | Lab: Electronic Devices and Circuits | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 6 | 3 | PC | ET/ET | 22ET306 | Digital System Design | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 7 | 3 | PC | ET/ET | 22ET307 | Lab: Digital System Design | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 8 | 3 | PC | ET/ET | 22ET308 | Computer Organization | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 3 | PC | ET/ET | 22ET309 | Network Theory | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 3 | PC | CV/ET | 22ET310 | Environmental Sustainability, Pollution and Management | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| | | | | | **TOTAL THIRD SEM** | | **21** | **1** | **6** | **28** | **25** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 3 | HS | T&P | MLC2123 | YCCE Communication Aptitude Preparation (YCAP3) | **A** | 3 | 0 | 0 | 3 | 0 | | | | |
| 2 | 3 | | ET/ET | MLC109 | Exploring MATLAB | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| **Fourth Semster** | | | | | | | | | | | | | | | |
| 1 | 4 | BS | GE/MTH | 22ET401 | Probability and Statistical Theory | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 4 | PC | ET/ET | 22ET402 | Electromagnetic Fields | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 3 | 4 | PC | ET/ET | 22ET403 | Microcontroller and Interfacing | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 4 | PC | ET/ET | 22ET404 | Lab: Microcontroller and Interfacing | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 5 | 4 | PC | ET/ET | 22ET405 | Analog Communication | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 4 | PC | ET/ET | 22ET406 | Lab.: Analog Communication | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 4 | PC | ET/ET | 22ET407 | Control Systems | **T** | 3 | 1 | 0 | 4 | 3 | 30 | 20 | 50 | 3 Hours |
| 8 | 4 | PC | ET/ET | 22ET408 | Lab.: Control Systems | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 9 | 4 | PC | ET/ET | 22ET409 | Object Oriented Programming | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 4 | PC | ET/ET | 22ET410 | Lab.: Object Oriented Programming | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | **TOTAL FOURTH SEM** | | **18** | **1** | **8** | **27** | **22** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 4 | HS | T&P | MLC2124 | YCCE Communication Aptitude Prepartion (YCAP 4) | **A** | 3 | 0 | 0 | 3 | 0 | | | | |
| 2 | 4 | | ET/ET | MLC110 | Embedded System & IoT | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

**MSEs* = Two MSEs of 15 Marks each will be conducted and marks 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2023** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

# III SEMESTER
# 22ET301: Signals & Systems

**Course Outcomes:**

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

1. Classify systems based on their properties and determine the response of LTI system.
2. Analyze system properties based on impulse response and Fourier analysis.
3. Sample and reconstruct the signals.
4. Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

| **Unit:1** | **Signals and Systems** | **7 Hours** |
|---|---|---|

Continuous-Time and Discrete-Time Signals. Transformations of the Independent Variable. Continuous-Time and Discrete-Time Systems. Basic System Properties.

Discrete-Time LTI Systems: The Convolution Sum. Continuous-Time LTI Systems: The Convolution Integral. Properties of Linear Time-Invariant Systems. Causal LTI Systems Described by Differential and Difference Equations. Singularity Functions.

**Contemporary Issues related to Topic**

| **Unit:2** | **Fourier Series Representation of Periodic Signals.** | **7 Hours** |
|---|---|---|

The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals. Convergence of the Fourier series. Properties of Continuous-Time Fourier Series. Fourier Series Representation of Discrete-Time Periodic Signals. Properties of Discrete-Time Fourier Series. Fourier Series and LTI Systems. Filtering.

**Contemporary Issues related to Topic**

| **Unit:3** | **Fourier Transform.** | **6 Hours** |
|---|---|---|

The Continuous-Time Fourier Transform.

Representation of Aperiodic Signals: The Continuous-Time Fourier Transform. The Fourier Transform for Periodic Signals. Properties of the Continuous-Time Fourier Transform. The Discrete-Time Fourier Transform.

Representation of Aperiodic Signals: The Discrete-Time Fourier Transform. The Fourier Transform for Periodic Signals. Properties of the Discrete-Time Fourier Transform.

**Contemporary Issues related to Topic**

| **Unit:4** | **Time & Frequency Characterization of Signals and Systems.** | **6 Hours** |
|---|---|---|

The Magnitude-Phase Representation of the Frequency Response of LTI Systems. Concept of Frequency Response, Group Delay and Phase Delay. Time-Domain Properties of Ideal Frequency-Selective Filters. Time-Domain and Frequency-Domain Aspects of Non ideal Filters.

Representation of a Continuous-Time Signal by Its Samples: The Sampling Theorem. Reconstruction of a Signal from Its Samples Using Interpolation. Aliasing. Discrete-Time Processing of Continuous-Time Signals.

**Contemporary Issues related to Topic**

| Unit:5 | The Laplace Transform. | 6 Hours |
|---|---|---|
| The Laplace Transform. The Region of Convergence for Laplace Transforms. The Inverse Laplace Transform. Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot. Properties of the Laplace Transform. Analysis and Characterization of LTI Systems Using the Laplace Transform. System Function Algebra and Block Diagram Representations. The Unilateral Laplace Transform.<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **The Z-Transform.** | **7 Hours** |
| The z-Transform. The Region of Convergence for the z-Transform. The Inverse z-Transform. Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot. Properties of the z-Transform. Analysis and Characterization of LTI Systems Using z-Transforms. System Function Algebra and Block Diagram Representations. The Unilateral z-Transform.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Alan V. Oppenheim,Alan S. Willsky, with S. Hamid, Signals and Systems, 2nd edition, Prentice Hall. Publications |
| **2** | Hwei Hsu, Schaum's Outline of Signals and Systems, 4th edition 2002 McGraw-Hill |
| **Reference Books** | |
| **1** | B. P. Lathi, Principles of Signal Processing and Linear Systems, 1st edition, Oxford university |
| **2** | Simon Haykin and Van Veen, Wiley, Signals & Systems, 2nd Edition. 2005,TMH |
| **3** | Robert ,Signals & Systems Analysis Using Transformation Methods & MAT Lab, 1st edition 2003,McGraw-Hill Companies |
| **4** | C. L. Philips, J.M.Parr ,and Eve A.Riskin, Signals, Systems and Transforms, 3rd Edition,2004. Pearson education |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | https://eee.guc.edu.eg/Courses/Communications/COMM401%20Signal%20&%20System%20Theory/Alan%20V.%20Oppenheim,%20Alan%20S.%20Willsky,%20with%20S.%20Hamid-Signals%20and%20Systems-Prentice%20Hall%20(1996).pdf |
| **2** | http://people.disim.univaq.it/~costanzo.manes/EDU_stuff/Theory%20and%20Problems%20of%20Signals%20&%20Systems_Hsu_Schaum95.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://youtube.com/playlist?list=PLyqSpQzTE6M8KJ-XQ1m2vl3nd2ZUqKEN8 |

# III Semester
# 22ET302 – Lab: Signals & Systems

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Classify systems based on their properties and determine the response of LTI system.<br>2. Analyze system properties based on impulse response and Fourier analysis.<br>3. Sample and reconstruct the signals.<br>4. Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Understanding the Basic Signals |
| 2 | Properties of signals and their transformations |
| 3 | Introduction to systems and their classification. |
| 4 | Characterizations of System. |
| 5 | Convolution of Continuous Time and Discrete Time Signals |
| 6 | Implementation of Fourier series |
| 7 | Implementation of Continuous time Fourier Transform |
| 8 | Implementation of Discrete time Fourier Transform |
| 9 | Implementation of Laplace Transform |
| 10 | Implementation of z-Transform |
| 11 | Sampling and reconstruction |

# III Semester
# 22ET303 - Fundamentals of Management and Economics

**Course Outcomes:**

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

1. Explain the Functions of Management and identify tools and techniques of Marketing of goods and services
2. Analyze the role of Financial Accountancy and Management in the Organization
3. Develop perspective about the economy based on logical reasoning and estimate the economic outcomes.
4. Interprets comparative advantage of resources.

| Unit:1 | Principles of Management | 6 Hours |
|---|---|---|

Evolution of Management Thought: Scientific and Administrative Theory of Management, Definition and Concept of Management, Functions of Management: Planning, Organizing, Directing, Coordinating and Controlling, Motivational Theories, Concept of Leadership

**Contemporary Issues related to Topic**

| Unit:2 | Marketing Management | 6 Hours |
|---|---|---|

Marketing Management - Definition & scope, Selling & Modern Concepts of Marketing, Market Research, Customer Behaviors, Product Launching, Sales Promotion, Pricing, Channels of Distribution, Advertising, Market Segmentation, Marketing Mix, Positioning, Targeting

**Contemporary Issues related to Topic**

| Unit:3 | Financial Accountancy and Management | 7 Hours |
|---|---|---|

Definition & Functions of Finance department, Sources of finance, Types of capital, Types of Taxes, Introduction of Accountancy and its rules, Preparation of Books of Account- Jounal, Posting of transaction into ledger and preparation of trial balance, Introduction of trading account, profit and loss account and balance sheet

**Contemporary Issues related to Topic**

| Unit:4 | Introduction to Economics and engineering Economy: | 6 Hours |
|---|---|---|

Economics and engineering economy, Utility analysis- Cardinal, ordinal, Law of diminishing marginal utility, Laws of demand and supply, elasticity of demand, its measurement and application.

**Contemporary Issues related to Topic**

| Unit:5 | Engineering Production and Costs | 7 Hours |
|---|---|---|

Factors of Production: Land, Labour, Capital, Enterprise and their peculiarities, Concepts and types of costs, Law of Variable proportions (Law of diminishing marginal returns) and Return to Scale (Increasing, constant and decreasing), Economies and diseconomies of scale. Inflation: Meaning, types, causes and consequences, measures to control inflation, Concepts of deflation and Stagflation.

**Contemporary Issues related to Topic**

| Unit :6 | Market structures - equilibrium output and price | 7 Hours |
|---|---|---|
| Forms of market structures: Perfect competition, monopolistic competition, oligopoly, duopoly and monopoly, Demand and revenue curves for firm and industry in various forms of market structure, Total, average and marginal revenue curves, equilibrium of firms and industries under various forms of market structures, Price discrimination.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1.** | Principle of Management, 9thedition , Harold Koontz Ramchandra, Tata McGrow hills |
| **2.** | Marketing Management: Planning, Implementation and Control, 3rd Edition, Ramaswamy V.S. and Namakumari S, Macmillian |
| **3.** | Financial Services, 19th Edition, Khan M Y, Tata McGraw Hill, 19 |
| **4.** | Modern Economics, 13th Edition, H. L. Ahuja, S. Chand Publisher, 2009 |
| **5.** | Modern Economic Theory, 3rd edition, K. K. Devett, S. Chand Publisher,2007 |
| **6.** | Principle of Economics, 7th edition, Mankiw N. Gregory, Thomson, 2013 |
| **Reference Books** | |
| **1.** | Foundations of Financial Markets and Institutions, 3rd Edition, Fabozzi, Pretice Hall |
| **2.** | Fundamentals of Financial Instruments , 2nd Edition, Parameshwaran, Wiley India |
| **3.** | Marketing Management , 3rd Edition , RajanSaxena, Tata McGraw Hill |
| **4.** | Advance Economic Theory, 17th Edition, H. L. Ahuja, S. Chand Publisher, 2009 |
| **5.** | International Trade, 12th edition, M. L. Zingan, Vindra Publication, 2007 |
| **6.** | Macro Economics, 11th edition, M. L. Zingan, Vindra Publication, 2007 |
| **7.** | Monitory Economics:, 1st Edition, M. L. Sheth, Himayalaya Publisher, 1995 |
| **8.** | Economics of Development and Planning, 12th edition, S. K. Misra and V. K. Puri, Himalaya Publishing House, 2006. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0 |
| **2** | https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042 |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://onlinecourses.nptel.ac.in/noc22_mg104/preview |
| **2** | https://nptel.ac.in/ |
| **3** | https://onlinecourses.nptel.ac.in/noc20_mg31/preview |
| **4** | https://onlinecourses.nptel.ac.in/noc21_hs52/preview |
| **5** | https://onlinecourses.nptel.ac.in/noc22_hs67/preview |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

# III Semester
# 22ET304 - Electronic Devices and Circuits

**Course Outcomes:**

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

1. Analyze the transistor circuits for different configurations.
2. Design transistor circuit with suitable biasing and stabilization techniques.
3. Analyze the response of transistors at low and high frequency
4. Analyze the effect of feedback on gain and frequency of amplifiers
5. Analyze power amplifier circuits.

| Unit:1 | Bipolar Junction Transistors | 6 Hours |
|---|---|---|

PN junction diode and its application ,Bipolar Junction Transistors : Physical structure and operation modes, Active region operation of transistor, DC analysis of transistor circuits, Ebor-Moll model ,Current voltage characteristics of CE, CB, CC configuration Transistor as an amplifier, Transistor as a switch.

**Contemporary Issues related to Topic**

| Unit:2 | Transistor Biasing Techniques | 7 Hours |
|---|---|---|

Transistor Biasing, The Operating Point, Bias Stability, Self-Bias, Fixed bias, collector to base bias, Emitter feedback bias, Stabilization against Variations in Ico, VBE, AND β, Collector-Current Stability, Thermal Runaway

**Contemporary Issues related to Topic**

| Unit:3 | MOSFET and Biasing Techniques | 7Hours |
|---|---|---|

Field-effect Transistors -The Junction Field-effect Transistor, The Pinch-off Voltage Vp, The JFET Volt-Ampere Characteristics, MOSFET Device Structure and Physical Operation of MOSFET, Finite Output Resistance in Saturation, Characteristics of the MOSFET, Small Signal Equivalent Model, MOSFET Biasing by Fixing VGS, Biasing by Fixing VG and Connecting a Resistance in the Source, Biasing Using a Drain-to-Gate Feedback Resistor, Biasing Using a Constant-Current Source.

**Contemporary Issues related to Topic**

| Unit:4 | MOSFET Amplifiers and Small signal operation of MOSFET | 7 Hours |
|---|---|---|

MOSFET Amplifiers: Common Source, Common Drain and Common Gate Amplifiers. Small signal operation of MOSFET using π model and T model, Internal capacitances and high frequency model of MOSFET. Small signal operation of BJT.

**Contemporary Issues related to Topic**

| Unit:5 | Feedback Amplifiers and Oscillators | 6 Hours |
|---|---|---|
| Feedback Amplifier : The General Feedback Structure, Various properties of Negative and positive Feedback, The Four Basic Feedback Topologies. The series-shunt Feedback amplifier, The series-series Feedback amplifier, The shunt-shunt Feedback amplifier, The shunt-series Feedback amplifier, RC phase shift<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Power Amplifier** | **6 Hours** |
| Power Amplifier: Class A, Class B, Class AB and Class C, Class D. Power Efficiency, Power Dissipation, Cross-Over Distortion in Class AB Circuits, Class A Transformer Coupled Power Amplifier, and Harmonic Distortion due to Large Signal operation.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Sedra Smith, Microelectronics Circuits , 5th Edition 2010-01-07, Oxford Uni. Press |
| **2** | MillMan Halkias, Integrated Electronics , 7th edition 2009, Tata McGraw Hills |
| **Reference Books** | |
| **1** | Electronic Devices and Theory, BoyleStad, Nashelsky, 9th. Edition May 2010, PHI |
| **2** | Electronic Devices and Circuits, S Salivahanan, N Suresh Kumar, 3rd Edition, Tata McGraw Hills |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/3.MillmanHalkias-ElectronicDevicesCircuits.pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/ecopies%20of%20books/Electronics%20and%20Telecommunication/2.Microelectronic%20Circuits%20by%20Sedra%20Smith,5th%20edition.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://www.youtube.com/playlist?list=PL350612601E2DBFDE |
| **2** | https://onlinecourses.nptel.ac.in/noc21_ee80/preview |

# III Semester
# 22ET305 – Lab: Electronic Devices and Circuits

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Analyze the transistor circuits for different configurations.<br>2. Design transistor circuit with suitable biasing and stabilization techniques.<br>3. Analyze the response of transistors at low and high frequency<br>4. Analyze the effect of feedback on gain and frequency of amplifiers<br>5. Analyze power amplifier circuits. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | V- I characteristics of PN junction diode (Silicon), Zener diode, LED. |
| 2 | Find the i) Voltage regulation ii) Load Regulation of a Zener shunt regulator |
| 3 | Design Half wave & Full Wave Rectifier with filter |
| 4 | I/P & O/P Characteristics of Common Base Transistor |
| 5 | I/P & O/P Characteristics of Common Emitter Transistor Configuration |
| 6 | Obtain Frequency Response of single stage CE Amplifier |
| 7 | Drain and Transfer characteristics of Field Effect Transistor (FET) |
| 8 | Drain and Transfer characteristics of Metal Oxide Semiconductor Field Effect Transistor (MOSFET) |
| 9 | The frequency response of Common Source amplifier. |
| 10 | Design Fixed Bias circuit and Self Bias circuit and observe the effect of temperature variation on transistor parameters |
| 11 | Design Class B Amplifier with Cross Over Distortion. |
| 12 | Orcad based simulation of class AB power Amplifier. |
| 13 | Design RC Phase Shift Oscillator. |

# III Semester
# 22ET306 – Digital System Design

**Course Outcomes:**

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

1. Compare and contrast different FPGA and CPLD architectures.
2. Design, develop and analyze combinational circuits.
3. Design, develop and analyze sequential circuits.
4. Implement digital system using CAD tool.

| **Unit:1** | **Digital Design Fundamentals** | **7 Hours** |
|---|---|---|

Combinational & Sequential design issues, Introduction to finite state machines, Moore & Mealy Machine, Introduction to programmable devices, PLA, PAL, PROM, Structure of CPLDs, Introduction to FPGA, Architecture, CLB, IOB, Programmable Interconnect Points, Different type of programmable switches used in PLDs

**Contemporary Issues related to Topic**

| **Unit:2** | **HDL Design Methodologies** | **6 Hours** |
|---|---|---|

Requirements of HDL, Design Methodologies, Different Modelling styles, Introduction to Verilog, Elements of Verilog, Verilog Module definition, Elements of Module

**Contemporary Issues related to Topic**

| **Unit:3** | **Introduction to Verilog** | **7 Hours** |
|---|---|---|

Basic Concepts in Verilog, Reserved Keywords, Syntax & Semantics, Comments, Identifiers, Number Representation, System Representation, Verilog Ports, Verilog Data Types, Wire & Variables, Physical & Abstract, Constants, Parameter, Verilog Data Operators, Design entry in Verilog & Test bench, Compilation and synthesis, Timing analysis

**Contemporary Issues related to Topic**

| **Unit:4** | **Data Flow Modelling** | **6 Hours** |
|---|---|---|

Delay, Continuous Assignment, Delayed Continuous assignment, Structural Modelling Feature, Module Instantiation, Gate level Primitives, Gate Delays, Switch Level Primitives, User Defined Primitives

**Contemporary Issues related to Topic**

| Unit:5 | Behavioural Modelling | 7 Hours |
|---|---|---|
| Initial, Always, Procedural Assignment, Blocking and Non-Blocking assignments, Sequential & Parallel Blocks, Race around Condition, Timing Control, Procedural Statements, Conditional Statements if case loop repeat forever etc, Zero Delay Control, Event Based Timing Control, Compiler Directives, Assign De-assign, Force Release, Latch Models, FF Models, State Machine Coding ,Moore and Mealy Machines<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Combinational & sequential system Design** | **6 Hours** |
| Shift Registers, Counters, LFSR, Stacks and Queues, Multi bit Adders & Multiplier, Huffman Coding, Processor and Memory Model, CPU, System Tasks and Functions, Design Verification<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Verilog Digital System Design" Zainalabedin Navabi Second Edition, Tata McGraw, Hill , 2009 |
| **2** | Verilog HDL : A Guide to Digital Design and Synthesis Samir Palnitkar 2nd Edition , Prentice Hall India, 2003 |
| **Reference Books** | |
| **1** | A Verilog HDL Primer"J. Bhaskar, 2nd Edition, Star Galaxy Press 1997 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| 1 | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS /ELECTRONICS%20AND%20TELE/ |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/106/105/106105165/ |
| **2** | https://nptel.ac.in/courses/117105080 |

## III Semester
## 22ET307 –Lab: Digital System Design

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Compare and contrast different FPGA and CPLD architectures.<br>2. Design, develop and analyze combinational circuits.<br>3. Design, develop and analyze sequential circuits.<br>4. Implement digital system using CAD tool. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Study and design the equation z= ax+by+cxy by using Gate Level Modeling |
| 2 | Study and design the equation z= ax+by+cxy by using Operators of VERILOG |
| 3 | Study and design the equation z= ax+by+cxy by using UDP |
| 4 | Design Verilog Module for D Flip-Flop, T-FF , SR FF and J-K FF |
| 5 | Design Verilog Module for PIPO, PISO, SISO and SIPO Shift Register |
| 6 | Design Verilog Module for Binary and BCD Counters |
| 7 | Design Verilog Module for detection of Sequence (1101) by Moore FSM |
| 8 | Design Verilog Module for detection of Sequence (1011) by Mealy FSM. |
| 9 | Design Verilog Module for 4 bit Adder |
| 10 | Design Verilog Module for 4 bit Adder Subtractor |
| 11 | Activity -1 Project Based Learning /Mini Project based on Combinational logic Design |
| 12 | Activity -2 Project Based Learning /Mini Project based on Sequential logic Design. |

# III Semester
# 22ET308 – Computer Organization

**Course Outcomes:**

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

1. Explain how computers work
2. Know basic principles of computer's working
3. Analyze the performance of computers
4. Know how computers are designed and built
5. Explain issues affecting modern processors (caches, pipelines etc.)

| | | |
|---|---|---|
| **Unit:1** | **Introduction** | **7 Hours** |

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **Instruction sets** | **6 Hours** |

Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines ,Processor organization, Information representation, number formats.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Central Processing Unit** | **7 Hours** |

Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Control Unit Design** | **6 Hours** |

Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **Memories and Subsystems** | **8 Hours** |

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory. System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces

**Contemporary Issues related to Topic**

| Unit :6 | Parallel Processing | 5 Hours |
|---|---|---|
| Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | V.Carl Hammacher, ―Computer Organisation, Fifth Edition. |
| **2** | A.S.Tanenbum, ―Structured Computer Organisation, PHI, Third edition |
| **3** | Y.Chu, "Computer Organization and Microprogramming, II, Englewood Chiffs, N.J., Prentice Hall Edition |
| **Reference Books** | |
| **1** | Hayes J.P, ―Computer Architecture and Organization, PHI, Second edition |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/ELECTRONICS%20AND%20TELE/ |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/106/105/106105163/# |
| **2** | https://nptel.ac.in/courses/106106166 |

# III Semester
# 22ET309 – Network Theory

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Analyze electrical circuits using nodal and mesh analysis<br>2. Evaluate electrical circuit parameters using network theorems<br>3. Estimate steady state and transient response of electrical circuits using initial and final conditions<br>4. Analyze waveforms using Laplace transform<br>5. Evaluate parameters of two – port networks. |

| **Unit:1** | **Nodal Analysis of Electric Circuits** | **7 Hours** |
|---|---|---|
| Basics of electric circuits, circuit elements and their voltage – current relationship, classification of circuit elements, Series Circuit, Parallel circuit, Source shifting, sources - their types and characteristics, concept of equivalent sources, source transformation, nodal analysis of circuits containing resistors, inductors, capacitors and both independent and dependent sources to determine current, voltage, power, and energy.<br>**Contemporary Issues related to Topic** | | |

| **Unit:2** | **Mesh Analysis of Electric Circuits** | **7 Hours** |
|---|---|---|
| Mesh analysis of circuits containing resistors, inductors, capacitors and both independent and dependent sources to determine current, voltage, power, and energy. Network equation for RLC network, Mutual inductance , coefficient of coupling , dot convention, dot marking in coupled coils.<br>**Contemporary Issues related to Topic** | | |

| **Unit:3** | **Network Theorem** | **6 Hours** |
|---|---|---|
| Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem.<br>**Contemporary Issues related to Topic** | | |

| **Unit:4** | **Initial and Final Conditions, Impedance Functions and Circuit Analysis with Laplace Transform** | **7 Hours** |
|---|---|---|
| Review of Laplace Transform, concept of complex frequency; transform impedance and admittance, s–domain impedance and admittance models for resistor, inductor and capacitor, series and parallel combinations of elements. Transformed network on loop and mesh basis, Mesh and node equations for transformed networks, time response of electrical network with and without initial conditions by Laplace transform. Transient analysis.<br>**Contemporary Issues related to Topic** | | |

| Unit:5 | Transforms of other Signal Waveforms, Network Functions | 6 Hours |
|---|---|---|
| Unit step, ramp and impulse functions with and without time delay, their Laplace transform, waveform synthesis and its application to electrical networks.<br>Terminal pairs or ports, network functions for one port and two port networks, definition and physical interpretation of poles and zeros.<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Two Port Parameters** | **6 Hours** |
| Standard reference directions for the voltages and currents of a two – port network, defining equations for open circuit impedance, short circuit admittance, transmission, inverse transmission, hybrid and inverse hybrid parameters, relationships between parameter sets.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Network Analysis, M.E. Van Valkenburg, 3rdEdition, Prentice Hall. |
| **2** | Engineering Circuit Analysis, William H. Hayt, Jack E. Kemmerly, Steven M. Durbin, 6th Edition, Tata McGraw– Hill Publishing Company Limited. |
| **Reference Books** | |
| **1** | Network Analysis with applications, William D. Stanley, 4th Edition, Pearson Education. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Network%20Analysis%20Book.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/108/105/108105159/ |
| **2** | http://www.nitttrc.edu.in/nptel/courses/video/108105159/L12.html |

## III SEMESTER

## 22ET310: Environmental Sustainability, Pollution and Management

**Course Outcomes:**

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

The student will be able to

1. Gain insights into the efforts to safeguard the Earth's environment and resources.
2. Develop a critical understanding of the contemporary environmental issues of concern
3. Have an overview of pollution, climate change and national and global efforts to address adaptation and mitigation to changing environment through environmental management.
4. Learn about the major international treaties and our country's stand on and responses to the major international agreements.

| | | |
|---|---|---|
| **Unit:1** | **Environment, Natural Resources and Sustainable Development** | **6 Hours** |
| The man-environment interaction; Environmental Ethics and emergence of environmentalism; Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, water, soil and mineral resources, renewable, and non-renewable energy resources; Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs | | |
| **Unit:2** | **Environmental Issues, Conservation of Biodiversity and Ecosystems** | **6 Hours** |
| Environmental issues and scales: Land use and Land cover change, Global change; Biodiversity and its distribution, Ecosystems and ecosystem services, Threats to biodiversity and ecosystems, National and international policies for conservation. | | |
| **Unit:3** | **Environmental Pollution and Health** | **7 Hours** |
| Understanding pollution: Production processes and generation of wastes, Air pollution, Water pollution, Soil pollution and solid waste, Noise pollution, Thermal and Radioactive pollution. Impact on human health | | |
| **Unit:4** | **Climate Change: Impacts, Adaptation and Mitigation** | **7 Hours** |
| Understanding climate change, Impacts, vulnerability and adaptation to climate change, Mitigation of climate change | | |
| **Unit:5** | **Environmental Management** | **7 Hours** |
| Environmental management system: ISO 14001, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis, Environmental audit and impact assessment; Waste Management and sustainability; Ecolabeling /Eco mark scheme | | |
| **Unit :6** | **Environmental Treaties and Legislation** | **6 Hours** |
| Introduction to environmental laws and regulation, An overview of instruments of international cooperation, Major International Environmental Agreements, Major Indian Environmental Legislations, Major International organizations, and initiatives | | |
| | **Total Lecture** | **39 Hours** |

| | |
|---|---|
| **Text books** | |
| 1 | Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson |
| 2 | Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press |
| 3 | Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK |
| 4 | Jackson, A. R., & Jackson, J. M. (2000). Environmental Science: The Natural Environment and Human Impact. Pearson Education |
| 5 | Pittock, Barrie (2009) Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge. |
| 6 | Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press |
| 7 | Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press |
| **Reference Books** | |
| 1 | Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, Oxford University Press |
| 2 | Gilbert M. Masters and W. P. (2008). An Introduction to Environmental Engineering and Science, Ela Publisher (Pearson) |
| 3 | William P. Cunningham and Mary A. (2015). Cunningham Environmental Science: A global concern, Publisher (Mc-Graw Hill, USA) |
| 4 | Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022) Conservation through Sustainable Use: Lessons from India. Routledge. |
| 5 | Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/ standards |
| 6 | Barnett, J. & S. O'Neill (2010). Maladaptation. Global Environmental Change—Human and Policy Dimensions 20: 211–213 |
| 7 | Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press |
| 8 | Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp- content/uploads/2020/02/ convention-V-16-CURVE-web.pdf |

# III Semester
# Audit Course
# MLC2123 - YCCE Communication Aptitude Preparation (YCAP3)

## III Semester
## MLC109- Exploring MATLAB

### Course Outcomes:

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

1. Know the fundamentals of MATLAB
2. Apply MATLAB Programming for problem solving
3. Apply Graph Visualizations techniques for data interpretation
4. Develop MATLAB functions for problem solving

| | | |
|---|---|---|
| **Unit:1** | **Interacting with MATLAB** | **4 Hours** |
| Data Types: Numeric, logical, characters, dates, structures, cell arrays, programming- variables, keywords, special values, symbols, Operators: Basic Calculation operators, Relational Operators, Logical Operators, Vectors, Colon Notations or Range Operator, MATLAB Toolboxes | | |
| **Unit:2** | **Flow Control** | **3 Hours** |
| For Loop, If Statement, While Loop, Switch & Case. | | |
| **Unit:3** | **Matrices in MATLAB** | **4 Hours** |
| Creating and Concatenating Matrices, Adding and Subtracting Matrices, Vector Products and Transpose, Multiplying Matrices, The Identity Matrix, Arithmetic Operators + - * / \ ^ ', Building Tables. | | |
| **Unit:4** | **Data visualization I** | **4 Hours** |
| Basic Plotting Functions, Creating a Plot, Multiple Data Sets in One Graph, Specifying Line Styles and Colors, Plotting Lines and Markers, Adding Plots to an Existing Graph, Figure Windows, Multiple Plots in One Figure, Setting Grid Lines, Saving Figures | | |
| **Unit:5** | **Data visualization II** | **3 Hours** |
| Creating specialized plots, Mesh, surface, feather plot, pie chart, bar graph | | |
| **Unit :6** | **Functions in MATLAB** | **6 Hours** |
| Types of Program Files, Script files, MATLAB Calling Priority, MATLAB Functions -- Basic Features, Types of MATLAB Functions, Functions, Workspaces In MATLAB, Structure of a Function M-File, Multiple Inputs and Outputs for a Function, Functions of Multiple Variables and sub function, Case Study. | | |
| | **Total Lecture Hours** | **24 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers by Rudra Pratap, Oxford, 2010 |
| **2** | Understanding MATLAB: A Textbook for Beginners, by S. N. Alam, S. S. Alam, 2013, I K International Publishing House Pvt. Ltd |
| **Reference Books** | |
| **1** | https://www.mathworks.com/help/pdf_doc/matlab/matlab_prog.pdf |
| **2** | https://www.mathworks.com/content/dam/mathworks/mathworks-dot-com/moler/intro.pdf |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

*(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)*

**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110


# Bachelor of Technology

# SoE & Syllabus 2022

# 4th Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's

**Yeshwantrao Chavan College of Engineering**

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Third Semester** | | | | | | | | | | | | | | | |
| 1 | 3 | BS | ET/ET | 22ET301 | Signals & Systems | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 3 | BS | ET/ET | 22ET302 | Lab:Signals & Systems | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 3 | 3 | HS | GE/HUM | 22ET303 | Fundamentals of Management and Economics | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 3 | PC | ET/ET | 22ET304 | Electronic Devices and Circuits | **T** | 3 | 1 | 0 | 4 | 4 | 30 | 20 | 50 | 3 Hours |
| 5 | 3 | PC | ET/ET | 22ET305 | Lab: Electronic Devices and Circuits | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 6 | 3 | PC | ET/ET | 22ET306 | Digital System Design | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 7 | 3 | PC | ET/ET | 22ET307 | Lab: Digital System Design | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 8 | 3 | PC | ET/ET | 22ET308 | Computer Organization | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 3 | PC | ET/ET | 22ET309 | Network Theory | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 3 | PC | CV/ET | 22ET310 | Environmental Sustainability, Pollution and Management | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hrs |
| | | | | | **TOTAL THIRD SEM** | | **21** | **1** | **6** | **28** | **25** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 3 | HS | T&P | MLC2123 | YCCE Communication Aptitude Preparation (YCAP3) | **A** | 3 | 0 | 0 | 3 | 0 | | | | |
| 2 | 3 | | ET/ET | MLC109 | Exploring MATLAB | **A** | 2 | 0 | 0 | 2 | 0 | | | | |
| **Fourth Semster** | | | | | | | | | | | | | | | |
| 1 | 4 | BS | GE/MTH | 22ET401 | Probability and Statistical Theory | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 4 | PC | ET/ET | 22ET402 | Electromagnetic Fields | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 3 | 4 | PC | ET/ET | 22ET403 | Microcontroller and Interfacing | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 4 | PC | ET/ET | 22ET404 | Lab: Microcontroller and Interfacing | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 5 | 4 | PC | ET/ET | 22ET405 | Analog Communication | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 4 | PC | ET/ET | 22ET406 | Lab.: Analog Communication | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 4 | PC | ET/ET | 22ET407 | Control Systems | **T** | 3 | 1 | 0 | 4 | 3 | 30 | 20 | 50 | 3 Hours |
| 8 | 4 | PC | ET/ET | 22ET408 | Lab.: Control Systems | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 9 | 4 | PC | ET/ET | 22ET409 | Object Oriented Programming | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 4 | PC | ET/ET | 22ET410 | Lab.: Object Oriented Programming | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | **TOTAL FOURTH SEM** | | **18** | **1** | **8** | **27** | **22** | | | | |
| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | | | | |
| 1 | 4 | HS | T&P | MLC2124 | YCCE Communication Aptitude Prepartion (YCAP 4) | **A** | 3 | 0 | 0 | 3 | 0 | | | | |
| 2 | 4 | | ET/ET | MLC110 | Embedded System & IoT | **A** | 2 | 0 | 0 | 2 | 0 | | | | |

**MSEs* = Two MSEs of 15 Marks each will be conducted and marks 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2023** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

# IV SEMESTER
# 22ET401: Probability and Statistical Theory

**Course Outcomes:**

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

1. Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities.
2. Use of probability distributions to solve real life problems.
3. Find probabilities and estimates parameters of various problems in sampling theory.
4. Identify scientific data to use proper curve fitting and find correlation and regression of variables.

| | | |
|---|---|---|
| **Unit:1** | **Random Variables & Probability Distributions** | **7 Hours** |

Conditional probability, Baye's theorem. Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **Mathematical Expectation** | **7 Hours** |

Mathematical Expectation, Variance & Standard Deviation, Moments, Moment generating function, Skewness and Kurtosis.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Special Probability Distributions** | **6 Hours** |

Binomial, Geometric, Poisson, Exponential, Normal distributions, Central Limit theorem.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Sampling Theory** | **6 Hours** |

Population and sample. Statistical inference. Sampling with and without replacement. Population parameters, sample statistics. Sampling distribution of means. Sampling distribution of proportions.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **Estimation** | **7 Hours** |

Unbiased and efficient estimates. Point estimates and interval estimates. Confidence interval for means, Confidence interval for proportions, Confidence interval for differences and sums of mean and proportions.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Curve Fitting** | **6 Hours** |

Fitting of straight line, $y = a + bx$, a parabola $y = a + bx + cx^2$, exponential curves and power curves by method of least squares; Lines of regression and correlation; Rank correlation.

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39 Hours** |

| Textbooks: | |
|---|---|
| 1. | M. R. Spiegel, The theory and problems of probability and Statistics, 5th Edition, Schaum series. (McGraw Hill). |
| 2. | Dr. B. S. Grewal, Engineering Mathematics, 43rd edition, Khanna Publisher |
| 3. | Michael J. Evans and Jeffrey S. Rosenthal, Probability and Statistics, 2nd edition. |

| Reference Books: | |
|---|---|
| 1. | Miller Freund and Johnson, Probability and Statistics for Engineering, 6th edition, Richard A. Johnson |
| 2. | S. C.Gupta and V.K.Kapoor, Fundamentals of Mathematical statistics, 3rd Edition, Sultan Chand and Sons. |
| 3. | E. K.Bowen, M. K.Star , Basic Statistics for Business and economics, 3rd edition, McGraw Hill |

| YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS] | |
|---|---|
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/ |

| MOOCs Links and additional reading, learning, video material | |
|---|---|
| **1** | https://nptel.ac.in/courses/111105041 |
| **2** | https://archive.nptel.ac.in/courses/111/105/111105090/ |
| **3** | https://onlinecourses.nptel.ac.in/noc21_ma74/preview |

## IV Semester
## 22ET402 - Electromagnetic Field

**Course Outcomes:**

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

1. Use appropriate co-ordinate systems for solving electromagnetic fields problems.
2. Apply the principles of electrostatics & magneto-statics for the solution of problems relating to electric and magnetic field.
3. Analyze static and time varying fields using Maxwell's equations.
4. Examine wave propagation in different medium.

| Unit:1 | Coordinate systems | 6 Hours |
|---|---|---|

Orthogonal coordinate systems: Cartesian, cylindrical, spherical and transformations, Gradient of a Scalar Field. Divergence of a Vector Field , Curl of a Vector Field , Laplacian Operator, Irrotational and solenoidal field.

**Contemporary Issues related to Topic**

| Unit:2 | Electric Field Intensity | 7 Hours |
|---|---|---|

Coulomb's law , Electric field intensity for different charge distribution : point , line surface , volume , Concept of electric flux , Gauss's law and it's application to field computation in symmetric structures and non symmetric structures , Divergence theorem

**Contemporary Issues related to Topic**

| Unit:3 | Concept of energy & work done | 7 Hours |
|---|---|---|

Concept of energy & work done in moving a point charge : linear and circular path , Electric scalar potential :Absolute Potential and potential difference , Conservative property of Potential field , Potential field of a system of charges : circular ring and disk Dipole moment, electric field at a distant point due to electric dipole, Electrostatic energy density. Poisson's and Laplace's equation and its examples of solutions, Uniqueness of electrostatic solution

**Contemporary Issues related to Topic**

| Unit:4 | Magnetic Field Intensity | 7 Hours |
|---|---|---|

Biot –Savart law and applications to infinite and finite current filament, Ampere's Circuital law and applications to line charge, coaxial transmission cables, uniform current sheet charge, solenoid, toroid ,Stoke's Theorem Magnetic flux and magnetic flux density , Scalar and vector magnetic potential, Nature of magnetic materials , boundary conditions at interface of two magnetic fields , Potential energy.

**Contemporary Issues related to Topic**

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| Unit:5 | Maxwell's equations | 6 Hours |
|---|---|---|
| Time varying fields and Maxwell's equations: Faradays law, Displacement current, Maxwell's equation in point form, Maxwell's equations in integral form.<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Uniform plane wave** | **6 Hours** |
| Uniform plane wave, wave propagation in free space, wave propagation in Dielectrics, Poynting's Theorem and wave equations<br>**Contemporary Issues related to Topic** | | |
| | **Total Lecture Hours** | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | William H. Hayt,Engineering Electromagnetics,Seventh Edition,Tata McGraw – Hill. |
| **2** | J D Kraus,Electromagnetics,4th edition1992,McGraw – Hill |
| **3** | David K. Cheng,Field and Wave Electromagnetics,Second Edition 21 Jan 2010,Addison Wesley. |
| **Reference Books** | |
| **1** | Ashutosh Pramanik,Electromagetism Theory and application,2nd Edition2009,Prentice Hall |
| **2** | M. N. O. Sadku,Elements of Electromagnetis,Oxford Press |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/elements-of-electromagnetics-by-matthew-n-o-sadiku.pdf |
| **2** | chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Engineering%20Electromagnetics%20-%20William%20%20Hayt.pdf |
| **3** | chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/EM_Hayt_6th.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://youtube.com/playlist?list=PLuv3GM6-gsE3-hVNaw-YEb7EeY5XVPZdz |
| **2** | https://www.youtube.com/watch?v=pGdr9WLto4A<br>https://www.youtube.com/watch?v=NNny9gMh_jo |
| **3** | https://www.youtube.com/watch?v=6FZusYyg0Po |

# IV Semester
# 22ET403 - Microcontroller and Interfacing

| Course Outcomes: |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Elaborate 8051 microcontroller architecture.<br>2. Develop assembly language programs.<br>3. Develop embedded C language program<br>4. Interface peripherals with 8051 microcontroller to solve real life problems. |

| Unit:1 | 8051 ARCHITECTURE | 6 Hours |
|---|---|---|
| Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview.<br>**Contemporary Issues related to Topic** | | |

| Unit:2 | ASSEMBLY LANGUAGE PROGRAMMING | 7 Hours |
|---|---|---|
| Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs.<br>**Contemporary Issues related to Topic** | | |

| Unit:3 | EMBEDDED C PROGRAMMING | 6 Hours |
|---|---|---|
| I/O Interfacing such as LED, switches, 7 segment display, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access<br>**Contemporary Issues related to Topic** | | |

| Unit:4 | TIMERS AND SERIAL COMMUNICATION | 6 Hours |
|---|---|---|
| Timer programming in assembly and C: Various modes of operation, SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, 8051 connection to RS 232. Serial data transfer programs.<br>**Contemporary Issues related to Topic** | | |

| Unit:5 | INTERRUPTS AND OFF-CHIP INTERFACING | 7 Hours |
|---|---|---|
| 8051 interrupts, Interrupts programming in assembly and C, programming timer interrupt, external interrupt, serial interrupt Interfacing and programming for LCD, Interfacing RTC.<br>**Contemporary Issues related to Topic** | | |

| Unit :6 | INTERFACING OF OTHERS OFF- CHIP DEVICES | 7 Hours |
|---|---|---|
| Interfacing of ADC, DAC, stepper motor, DC motors.<br>**Contemporary Issues related to Topic** | | |
| | **Total Lecture Hours** | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded systems using assembly & C, Pearson Education Asia LPE |
| **2** | Myke Predko, Programming and Customizing the 8051 Microcontroller, McGraw-Hill |
| **3** | Kenneth Ayala, The 8051 Microcontroller , CENGAGE Learning |
| **Reference Books** | |
| **1** | Douglas V Hall, Intel or Atmel MCS 51 Family Microcontrollers Data Sheets, Tata McGraw Hill |
| **2** | A. K. Ray, K. M. Bhurchandi Microprocessor & Interfacing, Tata McGraw Hill |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/1.(eBook)%20Delmar%20Thomson%20-%20The%208051%20Microcontroller%20Architecture,%20Programming%20and%20Applications%201991.pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Book%208051microcontroller-ayala.pdf |
| **3** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/the_8051_microcontroller_and_embedded_systems_using_assembly_and_c-2nd-ed_by_mazidi.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/108/105/108105102/ |
| **2** | https://archive.nptel.ac.in/courses/106/108/106108100/ |
| **3** | https://archive.nptel.ac.in/courses/117/104/117104072/ |

## IV Semester
## 22ET404 - Lab: Microcontroller and Interfacing

**Course Outcomes:**

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

1. Elaborate 8051 microcontroller architecture.
2. Develop assembly language programs.
3. Develop embedded C language program
4. Interface peripherals with 8051 microcontroller to solve real life problems.

| Sr. No. | Experiments based on |
|---|---|
| 1 | Add data bytes in a internal RAM |
| 2 | Data block transfer |
| 3 | Find the maximum data byte in a block |
| 4 | Count even or odd numbers present in a data block |
| 5 | Conversion number to its equivalent another number |
| 6 | Toggle LED connected to port pin of micro-controller 8051 |
| 7 | Display BCD no. on seven segment display or Display character on LCD. |
| 8 | Rotate stepper motor into clockwise /counter clockwise direction |
| 9 | Generate sawtooth waveform using DAC |
| 10 | Interfacing of RTC DS12887 with 8051 microcontroller & display current date & time serially |
| 11 | Read Analog signal from channel 2 of ADC and store it to internal RAM |
| 12 | Interfacing of servo motor with 8051 |

# IV Semester
# 22ET405 - Analog Communication

| Course Outcomes: |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Analyze different analog modulation techniques.<br>2. Analyze communication receiver and Evaluate different parameters<br>3. Analyze and comprehend concept of television transmission and reception.<br>4. Describe and analyze noise, Pulse modulation techniques and wave propagation of signals |

| Unit:1 | Amplitude Modulation | 7 Hours |
|---|---|---|

Block Diagram of Communication system, Need for modulation, Amplitude Modulation (AM), DSB-SC, SSB, VSB Transmissions, Mathematical Analysis, modulation index, frequency spectrum, power requirement of these Systems, AM Generation Method.

**Contemporary Issues related to Topic**

| Unit:2 | Angle Modulation | 7 Hours |
|---|---|---|

Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, narrowband & wideband FM, noise triangle in FM, Pre-emphasis & De-emphasis techniques, Phase modulation, power contents of the carrier & the sidebands in angle modulation, FM Generation Method.

**Contemporary Issues related to Topic**

| Unit:3 | Radio Receivers | 6 Hours |
|---|---|---|

Basic TRF Receiver, Super heterodyne receiver, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AM Detectors, FM discriminators, AGC technique.

**Contemporary Issues related to Topic**

| Unit:4 | Composite Video Signal | 7 Hours |
|---|---|---|

Color Composite Video Signal, Horizontal sync and blanking pulses, Vertical sync and blanking pulses, color burst signal, Interlaced and Sequential scanning, Resolutions, CCIR-B Standards, TV Fundamentals, TV Transmitter and Receiver Block diagram. HDTV Introduction and definition, Digital TV receiver, Merits of digital TV receiver.

**Contemporary Issues related to Topic**

| Unit:5 | Noise | 6 Hours |
|---|---|---|

Sources of noise, External Noises, Internal Noises, Thermal noise, noise calculations, equivalent noise bandwidth, noise figure of an amplifier, effective noise temperature, calculation of noise figure for cascaded stages.

**Contemporary Issues related to Topic**

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| Unit :6 | Pulse Modulation, Radiation & Propagation of signals | 6 Hours |
|---|---|---|
| Generation and Demodulation of PAM, PWM, PPM.<br>Basics of Radiation, Mechanisms of propagation, Ground wave, space wave and sky wave propagation, fading, diversity reception.<br>**Contemporary Issues related to Topic** | | |
| | **Total Lecture Hours** | **36 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Gorge Kennedy,"Electronic Communication System", Tata McGraw-Hill, 4thEdition-(Year: 1999). |
| **2** | G. K. Mithal," Radio Engineering (Principles Of Communication Systems)", Edition, 15 ; Publisher, Khanna, 1988. |
| **3** | R. R. Gulati, "Modern Television Practice", New Age International publishers, 3rdEdition 2006. |
| **Reference Books** | |
| **1** | K. Sam Shanmugam,"Digital and Analog communication systems", John Wiley & Sons, 1st edition 1979. |
| **2** | Frenzel,"Communication Electronics", MGH. Third Edition 2001 |
| **3** | Dhake. A. M," Television and Video Engineering" ,Tata McGraw Hill 2nd Edition MAY 2001. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/KENNEDY%204th%20edition.pdf. |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/ANALOG%20COMMUNICATIONS%20-%20Dr.%20B.V.Raju%20Institute%20of%20(%20PDFDrive.com%20).pdf |
| **3** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **4.** | https://harshasnmp.files.wordpress.com/2017/11/monochrome-and-colour-television-r-r-gulati.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL Course on Analog Communication by Prof. Goutam Das, IIT Kharagpur, https://nptel.ac.in/courses/117105143 |

# IV Semester
# 22ET406 – Lab: Analog Communication

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Analyze different analog modulation techniques. |
| 2. Analyze communication receiver and Evaluate different parameters |
| 3. Analyze and comprehend concept of television transmission and reception. |
| 4. Describe and analyze noise, Pulse modulation techniques and wave propagation of signals |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Amplitude Modulation. Calculate Modulation Index, Bandwidth and plot its frequency spectrum. |
| 2 | Amplitude Demodulation. |
| 3 | DSB-SC AM using Diode ring modulator. Calculate Bandwidth and plot its frequency spectrum. |
| 4 | Frequency Modulation. Calculate Modulation Index, Bandwidth and plot its frequency spectrum. |
| 5 | Frequency Demodulation. |
| 6 | Signal analysis of AM Super heterodynes Radio Receiver. |
| 7 | Analyze Composite Video Signal (CVS) and Color Composite Video Signal (CCVS) |
| 8 | Analyze various signals at the different stages of CTV. |
| 9 | Pulse Amplitude Modulation and Demodulation |
| 10 | Pulse Position Modulation and Demodulation |
| 11 | Pulse Width Modulation and Demodulation |
| 12 | Mini Project |

## IV Semester
## 22ET407 - Control Systems

| Course Outcomes: |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Apply block diagram reduction technique and signal flow graph for transfer function |
| 2. Analyze the characteristic of feedback control system |
| 3. Explain and analyze time response of first and second order control systems for different standard test signals |
| 4. Determine the stability of linear control system |
| 5. Perform frequency domain analysis of linear control system using Bode plot and Nyquist stability criterion |

| Unit:1 | Introduction to Control Systems | 7 Hours |
|---|---|---|
| Basic Components of Control System, Open loop control and close loop control with examples, classification of control systems. Transfer Function, block diagram algebra & reduction techniques, signal flow graph, its constructions and Mason's gain formula.<br>**Contemporary Issues related to Topic** | | |

| Unit:2 | Mathematical modelling and Characteristics of Feedback Control Systems | 5 Hours |
|---|---|---|
| Mathematical modelling of physical system: Electrical, mechanical, electro-mechanical systems.<br>Characteristics of Feedback Control Systems: Effect of negative feedback compared to open loop system such as – sensitivity to parameter variation, speed of time response, bandwidth, disturbance rejection and linearizing effect, Effect of positive feedback.<br>**Contemporary Issues related to Topic** | | |

| Unit:3 | Time Domain Analysis of Control Systems | 7 Hours |
|---|---|---|
| Concept of transient response, Steady state response and time response, standard test signals, system type, dominant poles, steady state error (ess ) analysis, static error constants, Time response of first order systems, Transfer function of second order system, Time response of second order system, Time response specifications of second order system, Relation between roots of characteristic equation, damping ratio and transient response, Controllers (proportional, Integral and derivative).<br>**Contemporary Issues related to Topic** | | |

| Unit:4 | Concept of stability | 7 Hours |
|---|---|---|
| Concept of stability, stable, unstable, marginally, Absolutely and conditionally stable system, Necessary conditions for stability, method to determine stability, Routh - Hurwitz stability criterion with special cases, relative stability analysis and State Variable Analysis.<br>**Contemporary Issues related to Topic** | | |

| Unit:5 | Root Locus Technique | 6 Hours |
|---|---|---|
| Root Locus Technique: Definition, magnitude and angle criteria, properties of root locus, construction rules for root locus plot of negative feedback systems, determining the gain from root locus plot, effect of addition of poles and zeros.<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Frequency domain analysis** | **7 Hours** |
| Frequency domain analysis of control systems: Concept of frequency response and sinusoidal transfer function, resonant frequency, resonant peak, cut off frequency, bandwidth, correlation between time and frequency response, polar plot, inverse polar plot, bode plot, Stability in Frequency domain: Nyquist stability criterion, Assessment of relative stability using Nyquist criterion, concept of gain margin and phase margin and its computation using polar plot and log magnitude versus phase plot<br>**Contemporary Issues related to Topic** | | |
| | **Total Lecture Hours** | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | I. J. Nagrath& M Gopal, Control system engineering, 5th Edition, New Age International, 2007. |
| **2** | Katsuhiko Ogata, Modern Control Engineering, Prentice-Hall of India Pvt Ltd., New Delhi, 3rd edition, 2000. |
| **3** | Norman S Nise, Control system engineering, 7th Edition, Wiley & sons, 2014. |
| **Reference Books** | |
| **1** | Ashok Kumar, Sigma Series: Control Systems, 1st Edition, McGraw – Hill. |
| **2** | M. Gopal, Control systems: Principles and design, 4th Edition, McGraw - Hill |
| **3** | B. C. Kuo, Automatic Control Systems, Prentice-Hall of India Pvt Ltd., New Delhi, 7th edition, 1991. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/yccelibrary.html |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/107/106/107106081/ |
| **2** | https://nptel.ac.in/courses/108/106/108106098/ |

## IV Semester
## 22ET408 – Lab: Control Systems

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Apply block diagram reduction technique and signal flow graph for transfer function |
| 2. Analyze the characteristic of feedback control system |
| 3. Explain and analyze time response of first and second order control systems for different standard test signals |
| 4. Determine the stability of linear control system |
| 5. Perform frequency domain analysis of linear control system using Bode plot and Nyquist stability criterion |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Open loop and closed loop system |
| 2 | Effect of feedback on DC Servo system |
| 3 | TYPE 0, TYPE 1, TYPE 2, CONTROL SYSTEM |
| 4 | Step Impulse, Ramp response of a Transfer function |
| 5 | Time Response of a second order system |
| 6 | P, PI & PID controller |
| 7 | Transfer function from State model and state model from Transfer function |
| 8 | State from zeroes and Poles |
| 9 | Determine stability using Routh's criterion |
| 10 | Root locus from a Transfer function |
| 11 | Bode plot from a transfer Function |
| 12 | Polar plot from a transfer Function |
| 13 | Nyquist plot from a transfer Function |

## IV Semester
## 22ET409 - Object Oriented Programming

**Course Outcomes:**

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

1. Explain the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Demonstrate the use of various OOPs concepts with the help of C++ programs.
3. Develop C++ programs for implementing data structures using array and linked list.
4. Apply the knowledge of BFS,DFS and Dijkstra`s algorithm for traversal of Graph.
5. Develop C++ programs for implementing the concept of file handling, template and exception handling

| | | |
|---|---|---|
| **Unit:1** | Principles of Object Oriented Programming (OOP), Software Evaluation, OOP Paradigm, Basic Concepts of OOP, Benefits of OOP, Application of OOP. Introduction to C++, Tokens, Keywords, Identifiers, Variables, Operators, Manipulators. Expressions and Control Structures, Pointer, Arrays<br>**Contemporary Issues related to Topic** | **6 Hours** |
| **Unit:2** | Functions, Function Prototyping Parameters Passing in Functions, Values Return by Functions, Inline Functions, Friend and Virtual Functions. Classes and Objects, Constructors and Destructors<br>**Contemporary Issues related to Topic** | **7 Hours** |
| **Unit:3** | Operator overloading, Function Overloading, Inheritance, Types of Inheritance, Polymorphism, Friend and Virtual Functions.<br>**Contemporary Issues related to Topic** | **7 Hours** |
| **Unit:4** | Definition of a data structure, Primitive and Composite data types, Asymptotic notations, Operations of Arrays, Order lists, Stacks, Applications of Stack, Infix to Postfix Conversion, Queues, Operations of Queues.<br>**Contemporary Issues related to Topic** | **7 Hours** |
| **Unit:5** | Singly linked list, Operations, Doubly linked list, Operations, Trees and Graphs: Binary tree, Tree traversal; Graph, Definition, Types of Graphs, Traversal (BFS & DFS), Dijkstra`s algorithm<br>**Contemporary Issues related to Topic** | **6 Hours** |
| **Unit :6** | Files – classes for file stream operations – Opening, Closing and Processing files – End of file detection – File pointes – Updating a file – Error Handling during file operations – Command line arguments – Templates – Exception Handling.<br>**Contemporary Issues related to Topic** | **6 Hours** |
| | **Total Lecture Hours** | **39 Hours** |

| | |
|---|---|
| **Textbooks** | |
| **1** | Object Oriented programming with C++ ,3rd. Edition Year 2008, E. Balagurusamy McGraw-Hill Publication |
| **Reference Books** | |
| **1** | Object Oriented Programming in Microsoft C++,4th edition 2002, Robert Lafore , |
| **2** | Fundamental of data structure in C++,5th edition, Horowitz and S.Shani, Galgotia Publication |
| **3** | Computer algorithms, 2nd Edition , Horowitz, S.Shani and S.Rajasekaran , Galgotia Publication |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/yccelibrary.html |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://onlinecourses.nptel.ac.in/noc21_cs02/preview |
| **2** | https://archive.nptel.ac.in/courses/106/105/106105151/ |

## IV Semester
## 22ET410 – Lab: Object Oriented Programming

**Course Outcomes:**

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

1. Explain the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Demonstrate the use of various OOPs concepts with the help of C++ programs.
3. Develop C++ programs for implementing data structures using array and linked list.
4. Apply the knowledge of BFS,DFS and Dijkstra`s algorithm for traversal of Graph.
5. Develop C++ programs for implementing the concept of file handling, template and exception handling

| Sr. No. | Experiments based on |
|---|---|
| 1 | Different Control Structures in C++ |
| 2 | Function & Function overloading |
| 3 | Class, Object and Constructor. |
| 4 | Inheritance and Virtual function |
| 5 | Operator overloading. |
| 6 | Friend function. |
| 7 | Stack and Queue using array |
| 8 | Stack and Queue using link list. |
| 9 | File handling and template. |
| 10 | Command line arguments and exception handling |

# IV Semester
# MLC2124 - YCCE Communication Aptitude Preparation (YCAP4)

## IV Semester
## MLC110- Embedded System & IoT

### Course Outcomes:

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

1. Interface Arduino with peripherals.
2. Write a python programs.
3. Interface Raspberry pi with peripherals.
4. Design IoT based system.

| | | |
|---|---|---|
| **Unit:1** | **Programming Arduino** | **4 Hours** |
| Introduction to ARDUINO, ARDUINO Family, Arduino IDE, Programming in Embedded-C. | | |
| **Unit:2** | **Interfacing with Arduino - 1** | **4 Hours** |
| Interfacing with LED's, Switches, Seven Segment Display, Relays (AC Appliance Control), LCD, Buzzer, IR Sensors. | | |
| **Unit:3** | **Interfacing with Arduino - 2** | **4 Hours** |
| Interfacing Arduino with DC motor and serial devices GSM and GPS module. | | |
| **Unit:4** | **Python programming** | **4 Hours** |
| Variables, data types, control statements, functions, file handling. | | |
| **Unit:5** | **Raspberry Pi** | **4 Hours** |
| Introduction to Raspberry Pi, Interfacing with LED, switches, sensors, buzzer. | | |
| **Unit :6** | **IoT** | **4 Hours** |
| Concept of IoT and its Applications, Introduction to the IoT cloud platforms. Transfer of sensor data to the cloud using Raspberry Pi. | | |
| | **Total Lecture Hours** | **24 Hours** |


| **Textbooks** | |
|---|---|
| **1** | Ashwin Pajankar , Arduino Made Simple, First Edition, BPB PUBLICATIONS, 2018 |
| **2** | Muhammad Ali Mazidi, Shujen Chen, Eshragh Ghaemi, Arduino Programming From Beginning to Advanced , First Edition, MicroDigitalEd, 2019 |
| **3** | Arsheep Bahga, Vijay Madisetti, INTERNET OF THINGS - A HANDS-ON APPROACH , First edition, Orient Blackswan Private Limited, 2015 |
| **Reference Books** | |
| **1** | Kevin Spencer, Raspberry Pi: Learn The Basics Of Raspberry Pi Easily, 1st edition, CreateSpace Independent Publishing Platform, 2018. |


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| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

*(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)*

**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110


# Bachelor of Technology

# SoE & Syllabus 2022

## 5th Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's

**Yeshwantrao Chavan College of Engineering**

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Fifth Semester** | | | | | | | | | | | | | | | |
| 1 | 5 | PC | ET/ET | 22ET501 | Digital Communication | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 5 | PC | ET/ET | 22ET502 | Lab:Digital Communication | P | 0 | 0 | 2 | 1 | 1 | | 60 | 40 | |
| 3 | 5 | PC | ET/ET | 22ET503 | Analog Circuits | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 5 | PC | ET/ET | 22ET504 | Lab:Analog Circuits | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 5 | 5 | PC | ET/ET | 22ET505 | Fields & Radiating System | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 5 | PE | ET/ET | | Professional Elective I | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 7 | 5 | PE | ET/ET | | Lab:Professional Elective I | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 8 | 5 | OE-I | ET/ET | | Open Elective - I * | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 5 | OE -II | ET/ET | | Open Elective - II * | T | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 5 | PC | ET/ET | 22ET506 | Lab.: Electronics Design Workshop | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 11 | 5 | STR | ET/ET | 22ET507 | Industrial training, Seminar & Report | P | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| | | | | | **TOTAL FIFTH SEM** | | **18** | **0** | **10** | **27** | **23** | | | | |

| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | HS | T&P | MLC2125 | **YCAP5 :** | A | 3 | 0 | 0 | 3 | 0 | |
| 2 | 5 | | R&D | MLC125 | Design thinking | A | 2 | 0 | 0 | 2 | 0 | |

Professional Elective-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | PE | PC | 22ET511 | PE I : CMOS VLSI Design |
| 2 | 5 | PE | PC | 22ET512 | PE I :Lab:CMOS VLSI Design |
| 3 | 5 | PE | PC | 22ET513 | PE I : Sensors & Wearable Device |
| 4 | 5 | PE | PC | 22ET514 | PE I :Lab: Sensors & Wearable Device |
| 5 | 5 | PE | PC | 22ET515 | PE I : Discrete Structures and Algorithms |
| 6 | 5 | PE | PC | 22ET516 | PE I :Lab: Discrete Structures and Algorithms |
| 7 | 5 | PE | PC | 22ET517 | PE I : Optical Communication |
| 8 | 5 | PE | PC | 22ET518 | PE I :Lab: Optical Communication |
| 9 | 5 | PE | PC | 22ET519 | PE I : Digital Image Processing |
| 10 | 5 | PE | PC | 22ET520 | PE I :Lab: Digital Image Processing |
| 11 | 5 | PE | PC | 22ET521 | PEI: Internet of Things |
| 12 | 5 | PE | PC | 22ET522 | PEI: Lab: Internet of Things |

**Open Electives -I**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | OE I | PC | 22ET531 | OE I : Principles of Communication |
| 2 | 5 | OE I | PC | 22ET532 | OE I : Industrial Automation |
| 3 | 5 | OE I | PC | 22ET533 | OE I :Medical Electronics |
| 4 | 5 | OE I | PC | 22ET534 | OE I : Fundamentals of Image Processing |

**Open Electives -II**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | OE II | PC | 22ET551 | OE II :Fundamentals of Computer Networks |
| 2 | 5 | OE II | PC | 22ET552 | OE II :Soft Computing |
| 3 | 5 | OE II | PC | 22ET553 | OE II : Microcontrollers & Embedded systems |
| 4 | 5 | OE II | PC | 22ET554 | OE II : Fundamentals of Internet of Things |

**MSEs* = Two MSEs of 15 Marks each will be conducted and marks 2 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2022** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

## V Semester

## 22ET501 – Digital Communication

| **Course Outcomes:** | | |
|---|---|---|
| **Upon successful completion of the course the students will be able to**<br>1. Compare different source coding techniques.<br>2. Describe and analyze signal space concepts.<br>3. Distinguish various digital modulation techniques.<br>4. Describe & compare different channel coding techniques<br>5. Apply spread spectrum modulation for various applications of communication | | |
| **Unit:1** | **Digital Communication basics** | **7 Hours** |
| Fundamentals of Digital communication system, analog vs. digital communication, Block Diagram of Basic Digital Communication system, Sampling Process, PCM Generation and Reconstruction, Quantization Noise, Non-uniform Quantization, DPCM, Delta Modulation, adaptive delta modulation, Delta Sigma Modulation.<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Digital Source Coding** | **6 Hours** |
| Introduction to information theory, Shannon's channel capacity theorem, Channel Capacity of Binary Symmetric Channel, Huffman encoding, L-Z encoding algorithm.<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Signal Space Concept** | **7Hours** |
| Gram-Schmitt procedure, Signal space representation of modulated signals, Error probability and optimum receivers for AWGN channels, Matched filters.<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Digital Modulation Methods** | **6 Hours** |
| Data formats, Coherent and non-coherent binary modulation techniques , Generation and detection of Amplitude Shift Keying, Phase Shift Keying, , Frequency shift Keying, differential phase shift keying, , Quadrature Phase Shift Keying, Quadrate Amplitude shift keying (QASK), QAM and MSK, power spectra, bandwidth efficiency, BER ,Constellation diagram.<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **Channel Coding Techniques** | **7 Hours** |
| Review of channel coding, Linear block codes, cyclic codes, convolution, encoding and decoding, Viterbi algorithm .<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Spread Spectrum** | **6 Hours** |
| Study of PN sequences, direct sequence methods, Frequency hop methods, digital spread spectrum, slow and fast frequency hop, synchronization methods for spread spectrum, application of spread spectrum<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | Digital Communication, 4th edition Date:2005, John G Prokis, McGraw Hill |
| **2** | Digital Communication, 3rd edition August 2007, Simon Haykin, JOHN WILEY & SONS |
| **Reference Books** | |
| **1** | Modern Communication systems (Principles and application), 1st edition Publication: 1994, Leon W. Couch II,PHI |
| **2** | Digital Communication, 1st edition, Shanmugham, CBS Publisher |
| **3** | Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication |
| **4** | Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL Course on Modern Digital Communication by Prof. Suvra Sekhar Das, IIT Kharagpur, https://nptel.ac.in/courses/117105144 |
| **2** | NPTEL Course on Digital Communication IIT Bombay by Prof. Bikash Kumar Dey, https://nptel.ac.in/courses/117101051 |

# V Semester
# 22ET502 – Lab Digital Communication

**Course Outcomes:**

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

1. Analyze various source coding techniques.
2. Illustrate signal space concepts.
3. Elaborate digital modulation techniques.
4. Analyze different channel coding techniques
5. Apply spread spectrum modulation for various applications of communication systems.

| Sr. No. | Experiments based on |
|---|---|
| 1 | To perform sampling and reconstruction of signal and observe its waveforms. |
| 2 | To perform Pulse Code Modulation and observe its waveform. |
| 3 | To perform ASK and observe its waveforms. |
| 4 | To perform FSK and observe its waveform. |
| 5 | To perform PSK and observe its waveforms. |
| 6 | To study and observe different type of digital data formats (RZ, NRZ and Manchester). |
| 7 | To perform delta modulation and observe its waveform. |
| 8 | To perform adaptive delta modulation and observe its waveforms. |
| 9 | To perform Linear block code. |
| 10 | To perform Convolutional code. |
| 11 | To perform simulation of modulation techniques using MATLAB |

## V Semester
## 22ET503 – Analog Circuits

**Course Outcomes:**

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

1. Design and analyze OP-AMP configurations.
2. Analyze OP-AMP circuit parameters and frequency response
3. Design linear and non- linear OP-AMP applications.
4. Explain special function ICs and design circuits using it.

| | | |
|---|---|---|
| **Unit:1** | **Operational Amplifier Fundamentals** | 7 Hours |

Ideal Op Amp, Basic Op Amp Configurations: Open loop, Feedback in OPAMP circuit: Inverting, Non-inverting, voltage follower

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **Op Amp Limitations- Static And Dynamic** | 6 Hours |

Simplified Op Amp Circuit Diagram, OPAMP parameters, Input Bias and Offset Current, Input Bias and Offset voltages, input offset error Compensation, open loop and closed loop Frequency response, Transient response, gain bandwidth product (GBP) & its effect, frequency compensation.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Linear Applications** | 7 Hours |

Summer, difference amplifier, integrator, differentiator, Current-to-Voltage Converter, Voltage-to-Current Converter, Instrumentation Amplifiers and Transducer Bridge amplifiers.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Active Filters** | 6 Hours |

Transfer function, first order filter, standard frequency response, KRC Filters with variable gain and Unity Gain, Second order LPF & HPF Butterworth filter design, BPF and BRF

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **Nonlinear Circuits & Waveform Generators** | 7 Hours |

Precision Rectifiers, clipper, clamper, Voltage Comparators, Schmitt Triggers, Sample-and-Hold Circuits, Log/Antilog amplifiers, Sinusoidal Oscillators based on Wein bridge and RC Phase shift, Square wave generation, Triangular wave generator

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Special Function Ic's** | 6 Hours |

PLL (IC 565), Monolithic timers (IC 555), Performance Specifications, D-A Converters (DACs), A-D Converters (ADCs).Voltage reference circuits, DC Dual Regulated Power supply for OP-AMP circuit

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39 Hours** |

| | |
|---|---|
| **Text books** | |
| **1** | Design with Operational Amplifiers and Analog Integrated Circuits 2002 - Sergio Franco, McGraw-Hill International |
| **2** | Linear Integrated Circuits 2015 - D. Roy Chaudhuri, New Age International |
| **3** | Op-Amps and Linear Integrated Circuits 2015- Ramakant A. Gayakwad, Pearson |
| **Reference Books** | |
| **1** | Linear Integrated Circuits 2010- S. Salivahanan, V. S. Bhaaskaran, McGraw-Hill |
| **2** | |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| 1 | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/ecopies%20of%20books/Electronics%20and%20Telecommunication/Analog%20Integrated%20Circuit%20Design,%202nd%20Edition%20(%20PDFDrive.com%20).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://www.youtube.com/watch?v=9g9dowLjmCA&list=PLp6ek2hDcoNDAw1BehPFazZ5ogPV8UlQa |

# V Semester
# 22ET504 –Lab Analog Circuits

**Course Outcomes:**

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

1. Design and analyze OP-AMP configurations.
2. Analyze OP-AMP circuit parameters and frequency response
3. Design linear and non- linear OP-AMP applications.
4. Explain special function ICs and design circuits using it.

| Sr. No. | Experiments based on |
|---|---|
| 1 | Verify gain and frequency response of Inverting amplifier / Non-inverting amplifier using IC 741 and simulation |
| 2 | Verify Op-amp parameters (a) CMRR (b) Slew Rate |
| 3 | Design and verify op-amp application as adder and subs tractor |
| 4 | Design and simulate gain and frequency response of Integrator and Differentiator circuit Using IC 741. |
| 5 | Design and simulate Second Order low pass filter / high pass filter. Also verify its frequency response characteristics. |
| 6 | A. Design and simulate Astable & Monostable Multivibrator circuits using IC 741<br>B. Design and verify Astable and Bistable Multivibrator circuits using IC 555 |
| 7 | A. Verify and simulate Schmitt Trigger circuits using IC 741<br>B. Design of a Half Wave and Full Wave Rectifier using IC 741 |
| 8 | To construct a RC Phase Shift oscillator and study its operation. |
| 9 | To verify the operation of various types of clippers and clampers like positive and negative using opamp 741. |
| 10 | To verify PLL IC 565 |
| 11. | Verification of Digital to Analog converter using R- 2R ladder circuit. |
| 12 | Mini Project |

## V Semester
## 22ET505 – Fields & Radiating Systems

**Course Outcomes:**

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

1. Estimate transmission lines parameters
2. Illustrate parallel plane waveguides, and rectangular waveguides
3. Analyze antenna parameters
4. Explain various types of antennas

| | | |
|---|---|---|
| **Unit:1** | **Transmission Lines** | **7 Hours** |

Introduction to transmission line theory, Transmission line parameters, Characterized impedance, Propagation constant, Phase constant, Attenuation constant, Waveforms distortion, Distortion less transmission lines, Loading of transmission lines, Reflection coefficient and VSWR, Equivalent circuits of transmission lines, Open and short circuited lines.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **Parallel Planes Waveguide** | **6 Hours** |

Guided Waves between parallel planes, Derivation of TE wave, Derivation of TM wave Characteristics of TE and TM wave, TEM waves and its characteristics.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Rectangular Waveguide** | **7 Hours** |

Introduction to rectangular waveguide, TM wave in rectangular waveguide, TE wave in rectangular waveguide, Characteristics of TE and TM wave in rectangular waveguide, Velocity, Guide wave length, Wave impedance, Field configurations.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Antenna Terminology** | **6 Hours** |

Retarded potentials, Field due to a current elements, Power radiated and radiation resistance, Reciprocity theorem applied to an antennas gain, Radiation intensity, Directivity and antenna gain.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **Antenna Arrays** | **7Hours** |

Two elements arrays and their directional characteristics, Linear arrays analysis, Broadside and End fire arrays, Pattern multiplication, Binomial arrays.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Types of Antenna** | **6 Hours** |

Log –periodic antennas, horn antennas& Lens Antennas,

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | K.D.Prasad, Antenna Theory And Waveguide by SatyaPrakashan ,New Delhi |
| **2** | Jordan and Balmain, Electromagnetic wave And Radiating System by Prentice hall of India |
| **Reference Books** | |
| **1** | C.A.Balanis, Antenna Theory & Design, John Wiley & sons |
| **2** | John D. Krauss, Antennas, McGraw-Hill International edition |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/cmos_kang.pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/30.CMOS%20Logic%20Circuit%20Design%20-%20(John%20P%20Uyemera).PDF |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://www.youtube.com/watch?v=wKL6WsEOl00 |
| **2** | https://www.youtube.com/watch?v=0OwmYAljz4A&list=PL0CD49F1FAD4E6FAA |

## V Semester

## 22ET506 – Lab Electronic Design Workshop

**Course Outcomes:**

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

1. Identify and test passive and active electronic components and devices.
2. Design regulated DC Power supply and PCB Layout.
3. Fabricate Assemble, Test and Troubleshoot mini project.

| Sr. No. | Experiments based on |
|---|---|
| 1 | To study the safety precautions and use of an Analog and Digital Multimeter for the measurement of DC/AC Voltages and Currents. |
| 2 | Identification and Testing of Passive Electronic Components. |
| 3 | Identification and Testing of Active Electronic Components. |
| 4 | To Identify and Test wires, cables, connectors, Switches, Relays Interconnected components. |
| 5 | To study Operation and Testing of Microphones and Speakers. |
| 6 | To Design, Construct and Test Fixed DC regulated power supply of ± 5V and ± 12V/500mA on Zero PCB. |
| 7 | To Design PCB layout of a mini project. |
| 8 | To fabricate PCB of a mini project. |
| 9 | To Perform assembling of a mini project. |
| 10 | To Test and Troubleshoot a mini project. |

# V Semester
# 22ET511 – PE I : CMOS VLSI Design

**Course Outcomes:**

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

1. Elaborate the characteristics of MOSFET, MOSFET based circuits and process of CMOS circuits fabrication
2. Design the MOSFET inverters, combinational and sequential circuits.
3. Design optimized CMOS circuits and layouts
4. Analyze switching characteristics and interconnection effects of MOS device, advance CMOS logic circuits.

| **Unit:1** | **Basic MOS Device Physics** | **7 Hours** |
|---|---|---|

MOS as a switch, MOS Structure & Symbols, MOS I/V Characteristics, MOS Enhancement Transistor, Second order effect of MOS: Body Effect, Junction Effect, Gate Leakage Effect, Channel Length Effect, Tunneling Effect, Velocity Modulation, Mobility Variation, Small Signal Modeling of MOSFETs

**Contemporary Issues related to Topic**

| **Unit:2** | **MOSFET Inverter Characteristics** | **7 Hours** |
|---|---|---|

Resistive Load Inverter, CMOS Inverter, Principle of operation & DC Characteristics, Tri-stated Inverter, Noise Margin Calculation, Logic Design with MOSFETs. Compound Gates in CMOS.

**Contemporary Issues related to Topic**

| **Unit:3** | **Fabrication & Layout of CMOS IC** | **6 Hours** |
|---|---|---|

Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process. CMOS Technology: N-well, P-well, Twin Tub Process, Silicon on Insulator (SOI) Process, Layout Design Rules, Physical Design of Logic Gates, Euler's Path, Stick Diagram, Layout, Latch-up Effect.

**Contemporary Issues related to Topic**

| **Unit:4** | **Switching Characteristics & Interconnection Effect** | **7 Hours** |
|---|---|---|

MOS Device Capacitance Estimation, Switching Characteristics: Rise Time, Fall Time,

Propagation Delay, Delay Estimation: Propagation Delay, Contamination Delay, Power Dissipation in CMOS: Static & Dynamic Power Calculation, Charge Sharing, Fan-in, Fan-out.

**Contemporary Issues related to Topic**

| Unit:5 | Combinational Circuit Design | 6Hours |
|---|---|---|
| Circuit Families, Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass-Transistor Circuits, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, Zipper Logic, Clocked CMOS Logic, CVSL, Bi-CMOS Logic Family<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Sequential Circuit Design** | **6 Hours** |
| Introduction, Sequencing Static Circuits. Sequencing Methods, Max-Delay Constraints, Min-Delay Constraints, Time Borrowing, Clock Skew, Circuit Design of Latches and Flip-Flops, Conventional CMOS Latches, Conventional CMOS Flip-Flops.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Neil H. E. Weste and K.Eshraghian, Principle of CMOS VLSI Design, 2nd edition, 1994,Addison Wesley VLSI Series |
| **2** | John P. Uyemura, Introduction to VLSI Circuits and Systems, 1st edition, Wiley Publication |
| **Reference Books** | |
| **1** | Sung-Mo Kang and Yusuf Leblebici , CMOS Digital Integrated circuits Analysis and Design, 3rd edition, 2008,Tata Mc-Graw Hill |
| **2** | Pucknell and K. Eshraghian, CMOS VLSI Design, 3rd edition, 2005, Prentice Hall |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/cmos_kang.pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/30.CMOS%20Logic%20Circuit%20Design%20-%20(John%20P%20Uyemera).PDF |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://onlinecourses.nptel.ac.in/noc21_ee09 |

# V Semester
# 22ET512 – PE I: Lab CMOS VLSI Design

**Course Outcomes:**

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

1. Elaborate the characteristics of MOSFET, MOSFET based circuits and process of CMOS circuits fabrication
2. Design the MOSFET inverters, combinational and sequential circuits.
3. Design optimized CMOS circuits and layouts
4. Analyze switching characteristics and interconnection effects of MOS device, advance CMOS logic circuits.

| Sr. No. | Experiments based on |
|---|---|
| 1 | DC and Transient analysis of NMOS and PMOS Transistor |
| 2 | DC and Transient analysis of CMOS Inverter |
| 3 | Design of combinational circuit using CMOS logic |
| 4 | Design of combinational circuit using pass transistor logic |
| 5 | Design of Sequential circuit using CMOS logic |
| 6 | Design of sequential circuit using pass transistor logic |
| 7 | Circuit design using CMOS Domino Logic |
| 8 | Circuit design using Zipper Logic |
| 9 | Circuit design using Clocked CMOS Logic |
| 10 | Mini Project |

# V Semester
# 22ET513 – PE I : Sensors & Wearable Devices

**Course Outcomes:**

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

1. Explore the basic idea of measurements, characteristics and the errors associated with measurements.
2. Realize the concept of resistive sensors and reactive sensors which can be employed for real life applications
3. Explain the working principle of special purpose sensors and the need for developing smart sensors.
4. Describe the taxonomy of the wearable devices and its design constraints for measuring physical and biological signals.
5. Design and perform experiments on the sensors and develop the projects based on the customer needs.

| **Unit:1** | **Introduction to Measurements and** | **7 Hours** |
|---|---|---|

Functional Elements of a Measurement System and Instruments, Statistical Analysis, Units and standards, Calibration and errors.

**Contemporary Issues related to Topic**

| **Unit:2** | **Introduction to Transducer/ Sensors** | **6 Hours** |
|---|---|---|

General concepts and terminology of Sensor systems, Transducers classification-sensors and actuators, General input-output configurations, Static and dynamic characteristics of measurement system

**Contemporary Issues related to Topic**

| **Unit:3** | **Resistive and reactive Sensors** | **6 Hours** |
|---|---|---|

Resistive sensors- Potentiometers, strain gages (piezo-resistive effect), resistive temperature detectors (RTD), thermistors, light dependent resistor (LDR), resistive hygrometers, resistive gas sensors, Linear variable differential transformers (LVDT), Capacitive sensors- variable capacitor, differential capacitor.

**Contemporary Issues related to Topic**

| **Unit:4** | **Self generating Sensors** | **6 Hours** |
|---|---|---|

Thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors, LM35.

Accelerometers: Characteristics and working principle, Types- Capacitive, Piezoresistive, piezoelectric; Gyroscopes: Characteristics and working principle

**Contemporary Issues related to Topic**

| **Unit:5** | **Smart Sensors** | **7 Hours** |
|---|---|---|

Overview of various smart sensors: Digital temperature sensor (DS1621, TMP36GZ), Humidity sensor, IR sensor

| | | |
|---|---|---|
| (FC51), Gas sensor (MQ2,MQ8), Pressure sensors (BMP180), Introduction to MEMS and Flexible sensors.<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Scope of Wearable Devices** | **7 Hours** |
| Role of Wearables, Attributes of Wearables, The Meta Wearables – Textiles and clothing, Social Aspects: Interpretation of Aesthetics, Adoption of Innovation, On-Body Interaction; Case Study: Google Glass, health monitoring, Wearables: Challenges and Opportunities.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| | |
|---|---|
| **Textbooks** | |
| **1** | B. C. Nakra, K.K. Choudhury, "Instrumentation, Measurement and Analysis" -3 rd Edition, Tata McGraw, 2009 |
| **2** | Jacob Fraden, "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer, 2010 |
| **3** | Edward Sazonov, Michael R Neuman, "Wearable Sensors: Fundamentals, Implementation and Applications" Elsevier, 2014 |
| **Reference Books** | |
| **1** | A.K. Sawhney, "Electrical and Electronic Measurements and Instrumentation", DhanpatRai |
| **2** | Er. R.K. Rajput, "Electronic Measurements and Instrumentation", S. Chand & Company Ltd. 3rd Edition. |
| **3** | Subhas C. Mukhopadhyay, "Wearable Electronics Sensors-For Safe and Healthy Living", Springer International Publishing, 2015. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/cmos_kang.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | |

## V Semester

## 22ET514 –PE I : Lab Sensors & Wearable Devices

**Course Outcomes:**

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

1. Explore the basic idea of measurements, characteristics and the errors associated with measurements.
2. Realize the concept of resistive sensors and reactive sensors which can be employed for real life applications
3. Explain the working principle of special purpose sensors and the need for developing smart sensors.
4. Describe the taxonomy of the wearable devices and its design constraints for measuring physical and biological signals.
5. Design and perform experiments on the sensors and develop the projects based on the customer needs.

| Sr. No. | Experiments based on |
|---|---|
| 1 | Strain gauge sensors for measurement of normal strain. |
| 2 | Displacement measurement using LVDT |
| 3 | Displacement measurement using Hall effect sensor |
| 4 | Displacement measurement using LDR |
| 5 | Temperature measurement using RTD |
| 6 | Temperature measurement using LM35 |
| 7 | Temperature measurement using Thermocouple |
| 8 | Level measurement using capacitive / resistive sensor |
| 9 | Distance measurement using IR / ultrasonic sensor |

# V Semester
# 22ET515 – PE I : Discrete Structures and Algorithms

## Course Outcomes:

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

1. Examine logic and proof concepts.
2. Use concepts of counting methods, and the pigeonhole principle.
3. Develop recursive algorithms, recurrence relations and search algorithms.
4. Understand hashing techniques, and group theory in computer science
5. Apply transport network and pumping network models for problem solving

| **Unit:1** | **LOGIC AND PROOFS, & Boolean Logic** | **7 Hours** |
|---|---|---|

Propositions, conditional propositions and logical equivalence, quantifiers, proofs, resolution proofs, mathematical induction, sets, sequences and strings, relations, equivalence relations, matrices of relations, functions, Boolean algebra, Boolean functions and synthesis of circuits.

| **Unit:2** | **COUNTING METHODS, AND THE PIGEONHOLE PRINCIPALE** | **6 Hours** |
|---|---|---|

Basic Principles, Permutation and Combination, Algorithms for Generating Permutations and Combinations, Introduction to Discrete Probability, Discrete Probability Theory, Generalized Permutation and Combinations, Binomial Coefficients and Combinatorial Identities, The Pigeonhole Principle.

| **Unit:3** | **ALGORITHMS** | **7 Hours** |
|---|---|---|

Overview and importance of algorithms and discrete structures. Fundamentals of algorithm analysis, Space and time complexity of an algorithm, Types of asymptotic notations and orders of growth, Algorithm efficiency – best case, worst case, average case, Analysis of non-recursive and recursive algorithms, Asymptotic analysis for recurrence relation – Recursive Tree Method. The Euclidean algorithm, Analysis of Euclidean Algorithm

| **Unit:4** | **RECURRENCE RELATIONS & SEARCH ALGORITHMS** | **6 Hours** |
|---|---|---|

Introduction, Solving Recurrence Relations, Application to the Analysis of Algorithms, Searching - Linear Search and binary search, Applications - Finding square root of 'n'-Longest, Common Prefix, Sorting – Insertion sort - Selection sort – Bubble sort – (Counting Sort) - Quick sort- Merge sort, Analysis, Applications - Finding the 'n' closest pair's

| **Unit:5** | **HASHING** | **7 Hours** |
|---|---|---|

Hash functions, open hashing-separate chaining, closed hashing - linear probing, quadratic probing, double hashing, random probing, rehashing, extendible hashing, Applications – Dictionary- Telephone directory
Heaps - Heap sort, Applications -Priority Queue using Heaps
AVL trees – Terminology - basic operations(rotation, insertion and deletion)

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| Unit :6 | ALGEBRIC STRUCTURES & NETWORK MODELS | 6 Hours |
|---|---|---|
| Introduction, A Maximal Flow Algorithm, The Max Flow, Min Cut Theorem, Matching, Group & Ring Theory: Definition and examples of groups, subgroups & rings. New topic to be announced time to time. | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Richard Johnsonbaugh Discrete Mathamatics, 5th Edition 2002, Pearson Education |
| **2** | C. L. Liu, D. P. Mohapatra Elements of Discrete Mathematics: A Computer Oriented Approach, 2017 TMH |
| **3** | Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press, 2009 |
| **Reference Books** | |
| **1** | Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd, 1992 |
| **2** | Tremblay J. P. and Manohar R., Discrete Mathematical Structures with applications to Computer Science, Tata Mc Graw Hill Publishing Co., 35th edition, 2008 |
| **3** | T.Veerarajan, Discrete Mathematics with Graph Theory and Combinatorics, Tata McGraw Hill, 2009 |
| **4** | Mark A. Weiss,Data Structures & Algorithm Analysis in C++, 3rd edition, 2008, PEARSON |
| **5** | Kurt Mehlhorn, and Peter Sanders – Algorithms and Data Sturctures The Basic Toolbox, Springer-Verlag Berlin Heidelberg, 2008 |
| **6** | Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd, 1992. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1.** | https://www.coursera.org/specializations/data-structures-algorithms |
| **2.** | https://nptel.ac.in/courses/106106127 |
| **3.** | https://nptel.ac.in/courses/106102064 |
| **4.** | https://nptel.ac.in/courses/106105225 |
| **5.** | https://onlinecourses.nptel.ac.in/noc22_cs26/preview |
| **6.** | http://ps-iiith.vlabs.ac.in/exp4/lab.html |
| **7.** | http://ps-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Computer%20Science |
| **8.** | http://cse01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Computer%20Science |
| **9.** | https://d3gt.com/unit.html?bipartite |
| **10.** | https://www.cs.usfca.edu/~galles/visualization/DFS.html |

## V Semester
## 22ET516– PE I : Lab Discrete Structures and Algorithms

**Course Outcomes:**

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

1. Examine logic and proof concepts.
2. Use concepts of counting methods, and the pigeonhole principle.
3. Develop recursive algorithms, recurrence relations and search algorithms.
4. Understand hashing techniques, and group theory in computer science
5. Apply transport network and pumping network models for problem solving

| Sr. No. | Experiments based on |
|---|---|
| 1. | Propositional LOGIC |
| 2. | PROOFS |
| 3. | Boolean functions, implementation of combinational logic circuit |
| 4. | The Euclidean algorithm, GCD Algorithm |
| 5. | Permutation and Combination |
| 6. | Recursive Algorithms |
| 7. | Discrete Probability |
| 8. | Second order homogeneous recurrence relation with initial conditions |
| 9. | Sorting Algorithms |
| 10. | Searching Algorithms |
| 11. | Group Activity |

## V Semester
## 22ET517 – PE I : Optical Communication

**Course Outcomes:**

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

1. Design and analyze an Optical Communication Systems with different types of losses.
2. Explore different types of sources and receivers in fiber optics.
3. Use different splicing techniques, connectors and coding.
4. Explore different methods of loss measurements in fiber optics.

| | | |
|---|---|---|
| **Unit:1** | **INTRODUCTION TO OPTICAL FIBERS** | **7 Hours** |

Introduction of fiber Optic system. Principle of optical communication-Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers-Ray mode, Numerical aperture and multipath dispersion in step index and graded index fibers structure, Modes and Power flow in fibers.
**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **SIGNAL DEGRADATION IN OPTICAL FIBERS** | **7 Hours** |

Attenuation, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides Group Delay , Material Dispersion, Wave guide Dispersion, Intermodal dispersion, Pulse Broadening , Mode Coupling
**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **FIBER OPTICAL SOURCES** | **6 Hours** |

Direct and indirect Band gap materials – LED structures – Light source materials – Quantum efficiency and LED power, Modulation of a LED, External Quantum efficiency –Laser Diodes structures, Fabry Perot cavity
**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **FIBER OPTICAL RECEIVERS** | **6 Hours** |

PIN and APD diodes – Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise – Comparison of Photo detectors – Fundamental Receiver Operation – Amplifier**.**

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **POWER LAUNCHING AND COUPLING IN DIGITAL TRANSMISSION SYSTEM** | **6Hours** |

Source to fiber power launching –Fiber to Fiber Joints-Fiber Splicing and connectors, Mechanical Misalignment, line coding –error correction, Optical Fiber Topologies, Wavelength division Multiplexing.
**Contemporary Issues related to Topic**

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| **Unit :6** | **MEASUREMENT IN OPTICAL FIBERS** | **7 Hours** |

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|---|---|---|---|---|---|
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| Attenuation measurement, Time domain dispersion and Frequency domain dispersion, NA measurement, Refractive index, Optical Time Domain Reflectrometry (OTDR), Eye pattern.<br>**Contemporary Issues related to Topic** |

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| **Total Lecture Hours** | **39 Hours** |

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| **Textbooks** | |
| **1** | Optical Fiber Communication 2008 - Gerd Keiser, McGraw-Hill International |
| **2** | Optical Communication, Principles and Practice - J.Senior, Prentice Hall of India |
| **Reference Books** | |
| **1** | Optical Communication System - S J. Gower, Prentice Hall of India |
| **2** | Fiber-Optic Communication System Third Edition - Govind Agrawal, John Willy & Sons |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://onlinecourses.nptel.ac.in/noc22_ee88<br>Fiber Optic Communication Technology - Course (nptel.ac.in) |

# V Semester
# 22ET518 – PE I : Lab Optical Communication

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to** |
| 1. Design and analyze an Optical Communication Systems with different types of losses. |
| 2. Explore different types of sources and receivers in fiber optics. |
| 3. Use different splicing techniques, connectors and coding. |
| 4. Explore different methods of loss measurements in fiber optics. |

| **Sr. No.** | **Experiments based on** |
|---|---|
| 1 | To set fiber optic analog link using optical fiber. |
| 2 | To set fiber optic digital link using optical fiber. |
| 3 | To measure the attenuation of signal in optic fiber due to bending loss |
| 4 | To determine the attenuation due to propagation loss in optic fiber. |
| 5 | To estimate the numerical aperture of the given fiber. |
| 6 | To form fiber optic voice link using MIC and Speaker |
| 7 | To Study and perform PAM in optical fiber link |
| 8 | To Study and perform PWM in optical fiber link |
| 9 | To perform Time Division Multiplexing in optical fiber. |
| 10 | To study the eye pattern of optical fiber link. |
| 11. | To measure reflection using OTDR in Optical fiber |

# V Semester
# 22ET519 – PE I: Digital Image Processing

**Course Outcomes:**

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

1. Examine the concepts of image enhancement, restoration, segmentation, representation and description.
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description
5. Extract the features for image representation and description

| Unit:1 | Digital Image fundamental | 7 Hours |
|---|---|---|

Digital Image fundamental steps and components of an image processing system, elements of visual perception, Image formation and acquisition, Image sampling and quantization, some basic relationship between the pixels, mathematical tools used in digital image processing

**Contemporary Issues related to Topic**

| Unit:2 | Intensity Transformation and Histogram Processing | 6 Hours |
|---|---|---|

Image Negative, Log Transformation, Power Law transformation, Linear Piecewise transformation, Histogram Equalization, Histogram Specification, Histogram Statistics

**Contemporary Issues related to Topic**

| Unit:3 | Filtering in spatial and frequency domain | 7 Hours |
|---|---|---|

Fundamentals of Spatial Filtering, Smoothing spatial filtering, Sharpening Spatial Filtering, Unsharp masking and High boost filtering, Filtering in Frequency Domain: Introduction to Fourier transform and frequency domain, Smoothing frequency domain filters, sharpening frequency domain filters

**Contemporary Issues related to Topic**

| Unit:4 | Image Restoration | 6 Hours |
|---|---|---|

Image Restoration Image degradation/restoration process, noise model, restoration in presence of noise, periodic noise reduction, linear, position invariant degradation, estimating degradation function, Inverse filtering, Wiener filtering

**Contemporary Issues related to Topic**

| Unit:5 | Image Segmentation | 6 Hours |
|---|---|---|

Fundamentals, Detection of discontinuities: Point, Line and Edge, Thresholding, Region based segmentation: Region Growing, Split and Merge, Morphology Operation

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| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
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| **Contemporary Issues related to Topic** | | |
| **Unit :6** | **Feature Extraction** | **7Hours** |
| Boundary Preprocessing: Chain Code, MPP, Signatures, Skeleton; Boundary Descriptors: Simple Descriptor, Shape Number, Fourier Descriptor, Statistical Moments; Region Feature descriptor: Basic descriptor, Topological Descriptor, Texture Descriptor<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| | |
|---|---|
| **Textbooks** | |
| **1** | Digital Image Processing by R.C. Gonzalez & R.E. Woods 4th Edition Pearson Education |
| **Reference Books** | |
| **1** | Digital Image processing using MATLAB by R.C. Gonzalez & R.E. Woods, Pearson Education |
| **2** | Digital Image processing by William K. Pratt 3rd Edition, 2004, John Wiley |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://link.springer.com/openurl?genre=book&isbn=978-3-642-34900-3 |
| **2** | http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6207-4 |
| **3** | http://link.springer.com/openurl?genre=book&isbn=978-3-540-77071-8 |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/117105079 |
| **2** | https://onlinecourses.nptel.ac.in/noc19_ee55/preview |

# V Semester
# 22ET520 – PE I : Lab Digital Image Processing

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. 1. Examine the concepts of image enhancement, restoration, segmentation, representation and description.<br>2. Apply basic image processing algorithms and filtering techniques for image enhancement.<br>3. Apply the algorithms for image restoration and segmentation<br>4. Apply the techniques for image representation and description<br>5. Extract the features for image representation and description |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Basic Operations on Digital Images |
| 2 | Image enhancement using Gray level Transformation |
| 3 | Image Enhancement Using Piecewise linear transformation |
| 4 | Image Enhancement Using Histogram Processing |
| 5 | Spatial Domain Filtering Techniques for Image Enhancement |
| 6 | Frequency Domain Filtering Techniques for Image Enhancement |
| 7 | Noise modeling and Basic Restoration Techniques |
| 8 | Image Segmentation |
| 9 | Image Compression |
| 10 | Image Representation and Description |

# V Semester
# 22ET521 – PE I : Internet of Things

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Explore the physical and Logical design of IoT.<br>2. Explore the M2M and NETCONF.<br>3. Explore python programming.<br>4. Apply basic skills of IoT to solve real life problems<br>5. Illustrate security for IoT. |

| **Unit:1** | **Introduction & Concepts:** | **5 Hours** |
|---|---|---|
| UNIT-1: Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **M2M & System Management with NETCONF-YANG** | **6 Hours** |
| M2M, Difference between IoT and M2M, SDN and NFV for IoT, Software defined Networking, Network Function Virtualization, Need for IoT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems management with NETCONF-YANG<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Developing Internet of Things** | **7 Hours** |
| Introduction, IoT Design Methodology, Python Data Types & Data Structures, Control Flow, Functions<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Logical Design using Python** | **7 Hours** |
| Python Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages, IoT Device-Raspberry Pi, Programming Raspberry pi with Python<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **IoT Security** | **7 Hours** |
| Effect of security threats on user, authentication using OTP validation, Security Requirements for the Internet of Secure Things, Secure Solutions, Secure Framework of the IoT Related to Perceptual Layer, Challenges in IoT Security<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Domain Specific IOTs** | **7 Hours** |
| Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
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| | |
|---|---|
| **Textbooks** | |
| **1** | Arshdeep Bahga and Vijay Madisetti , "Internet of Things, a hands on approach" , Universities Press (India)Pvt. Ltd. 2017, ISBN: 978-81-7371-954-7. |
| **Reference Books** | |
| **1** | Internet of Things : Technologies, Applications, Challenges and Solution B.K.Tripathy & J.Anuradha by CRC press publication |
| **2** | From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1 st Edition, Academic Press, 2014. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/UG%20COURSES/IIOT/IIOT%20(%20G%20Series).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/30.2019_Book_InternetOfThingsFromHypeToReal.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/106/105/106105166/ |
| **2** | https://onlinecourses.nptel.ac.in/noc21_ee85/preview |

## V Semester
## 22ET521 – PE I : Lab Internet of Things

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Explore the physical and Logical design of IoT.<br>2. Explore the M2M and NETCONF.<br>3. Explore python programming.<br>4. Apply basic skills of IoT to solve real life problems<br>5. Illustrate security for IoT. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Implementation of Python Program to find the numbers which are divisible by 7 and multiples of 5 in a given range |
| 2 | To implement Function to perform various operations in python |
| 3 | Implementation of python program for String manipulation using |
| 4 | Controlling Blink Rate of LED with Raspberry pi. |
| 5 | Interfacing DHT11 sensor with Raspberry pi. |
| 6 | To develop dictionary and perform various operations on dictionary in python.. |
| 7 | Uploading and Reading data from server. |
| 8 | Design of Smart Gardening system with IoT Technology |
| 9 | Design of Home Automation System with different sensor |
| 10 | Building Intrusion Detection System with Arduino and Ultrasonic Sensor |
| 11 | Mini-project |

## V Semester
## 22ET531 – OE I : Principles of Communication

| **Course Outcomes:** | | |
|---|---|---|
| **Upon successful completion of the course the students will be able to**<br>1. Describe analog communication systems and various modulation scheme.<br>2. Explain digital communication systems and various modulation scheme.<br>3. Analyse error correcting codes, including block codes.<br>4. Use the different application of satellite communication. | | |
| **Unit:1** | Analog Communication | **7 Hours** |
| Introduction to Communication Systems; Noise, Types of noise, sources of noise; Need for modulation, AM-Time domain representation, Frequency spectrum , power relations, DSB/SC, SSB**.**<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | Angle Modulation | **6 Hours** |
| Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, FM Transmitter block diagram.<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Digital Communication** | **7 Hours** |
| Introduction Digital Communication System; Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM; Waveform coding Techniques: Pulse code Modulation (PCM),Delta Modulation, Adaptive Delta modulation<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | Digital Modulation | **6 Hours** |
| Data formats ;Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Phase Shift Keying (PSK) – BPSK – QPSK– Quadrature Amplitude Modulation (QAM)<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | Information Theory | **6 Hours** |
| Entropy, Properties of entropy; source coding: Huffman coding**;** error control codes: Linear Block Code<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Satellite Communication** | **7 Hours** |
| Communication Satellite: Orbit and Description: A Brief history of satellite Communication, satellite Frequency Bands, Satellite Systems, Applications, frequency used link establishment Earth Station Technology: Transmitters, Receivers.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998. |
| **2** | J.Das "Principles of Digital Communication" New Age International, 1986 |
| **Reference Books** | |
| **1** | Kennedy and Davis "Electronic Communication Systems" Tata McGraw hill, 4th Edition, 1993. |
| **2** | Sklar "Digital Communication Fundamentals and Applications" Pearson Education, 2001. |
| **3** | Bary le, Memuschmidt, Digital Communication, Kluwer Publication, 2004. |
| **4** | B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998.<br>Taub & Schiling "Principles of Communication Systems" Tata McGraw Hill 2007 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL Course on Principles of Communication Systems By Prof. Aditya K. Jagannatham IIT Kanpur, https:// nptel.ac.in/courses/108/104/108104091/ |

# V Semester
# 22ET532 – OEI: Industrial Automation

**Course Outcomes:**

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

1. Analyse industrial need of automation and systems application.
2. Illustrate industrial automation components and hardware.
3. Impart the role of PLC in industry automation
4. Expose to various control techniques employed in process automation
5. Elaborate various applications of networking and communication systems.

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|---|---|---|
| **Unit:1** | **Introduction to Industrial Automation** | **7 Hours** |

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and Supervisory Control and Data Acquisition (SCADA).

**Contemporary Issues related to Topic**

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|---|---|---|
| **Unit:2** | **Automation Components** | **6 Hours** |

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves. Introduction of DC and AC servo drives for motion control.

**Contemporary Issues related to Topic**

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|---|---|---|
| **Unit:3** | **Automation in Process Industries** | **7Hours** |

Introduction to computer based industrial automation. Programming languages of PLC, Basic instruction sets. PLC programming, Ladder diagram, Sequential flow chart, PLC selection, PLC Installation.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Distributed Control System** | **6 Hours** |

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.

**Contemporary Issues related to Topic**

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| **Unit:5** | **SCADA/ HMI System Development** | **7 Hours** |

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Industrial Networking** | **6 Hours** |

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.

**Contemporary Issues related to Topic**

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| **Total Lecture Hours** | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies |
| **2** | Programmable logic controller, Dunning, Delmar |
| **Reference Books** | |
| **1** | Process Control Instrumentation Technology By. C.D. Johnson, PHI |
| **2** | Digital Communication, 1st edition, Shanmugham, CBS Publisher |
| **3** | Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication |
| **4** | Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | NPTEL, online courses and certification, Learn for free |
| **2** | https://swayam.gov.in/ |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL, online courses and certification, Learn for free |

# V Semester
# 22ET533 – OEI: Medical Electronics

**Course Outcomes:**

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

1.Describe various parameters of human anatomy and physiology.
2.Gain the knowledge of biopotential signals
3.Explain the functioning of different Measuring and Recording instruments
4.Elaborate the working of modern Imaging and Therapeutic Equipment

| **Unit:1** | **Fundamentals of Medical Instrumentation** | **6 Hours** |
|---|---|---|

Anatomy and physiology, biometrics, components of the man instrumentation , Physiological System of body, Sources of bioelectric potentials(Resting and action potential, Propagation of action potential and Bioelectric potential).

| **Unit:2** | **Physiological Transducer and Electrodes** | **7 Hours** |
|---|---|---|

Classification of transducers, Performance characteristics of transducers, Displacement, Position and Motion transducers, Pressure transducers, Photoelectric transducers, transducers for body Temperature measurement Optical Fibre sensors, biosensors and smart sensors. Electrodes for ECG, EEG, EMG, and Microelectrodes.

| **Unit:3** | **Biochemical and Non Electrical Parameter Measurement** | **7Hours** |
|---|---|---|

Blood pressure measurement, Blood flow meters and Cardiac output measurement , Plethysmography Heart sound, Measurement in Temperature ,Pulse and Respiratory system, Blood Cell Counters.

| **Unit:4** | **Biomedical Recorders** | **6 Hours** |
|---|---|---|

Nature of biomedical signal, Example of biomedical signals with the functioning of the organs. EMG, ECG, EEG,PCG lead system and recording methods ,typical waveform and signals characteristics, other biomedical recorders.

| **Unit:5** | **Medical Imaging System** | **6 Hours** |
|---|---|---|

X-ray imaging - Properties and production of X-rays, X-ray machine, applications of X-rays in medicine. Computed Tomography Principle, image reconstruction, scanning system and applications. Ultrasonic imaging systems: Basic pulse echo system, propagation of ultrasonic through tissues and reflections, display types, A-Scan, B-Scan, M-Scan, applications, real-time ultrasonic imaging systems and probes.

| **Unit :6** | **Therapeutic Equipment** | **7 Hours** |
|---|---|---|

Cardiac pacemaker: Need of cardiac pacemaker, external pacemaker and implantable pacemaker. Cardiac

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| Defibrillators: Need of Defibrillator, DC Defibrillator and Implantable Defibrillator.<br>Ventilators: Types of ventilators, Ventilator Terms ,classification of ventilators, Modern and high Frequency Ventilators . |

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| **Total Lecture Hours** | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | Leslie Cromwell, ―Biomedical Instrumentation and Measurement‖, Prentice Hall of India, New Delhi, 2007. |
| **2** | Joseph J.Carr and John M.Brown, ―Introduction to Biomedical Equipment Technology‖, John Wiley and Sons, New York, 2004. |
| **Reference Books** | |
| **1** | Khandpur, R.S., ―Handbook of Biomedical Instrumentation‖, TATA Mc Graw-Hill, second edition New Delhi,2003 |
| **2** | John G.Webster, ―Medical Instrumentation Application and Design‖, 3rd Edition, Wiley India Edition, 2007 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | https://www.pdfdrive.com/biomedical-instrumentation-and-measurements-d186986101.html |
| **2** | https://www.academia.edu/39250912/Handbook_of_Second_Edition_Biomedical_Instrumentation |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | |

# V Semester
# 22ET534 – OEI: Fundamentals of Image Processing

**Course Outcomes:**

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

1. Examine the concepts of image enhancement, restoration, segmentation, representation and description
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description

| **Unit:1** | **Introduction** | **7 Hours** |
|---|---|---|

Fundamental Steps in image processing, Component of Image processing system, Image formation Model, Sampling and quantization, Image Resolution, Interpolation Techniques, Concept of gray levels, Relationship between pixels.

**Contemporary Issues related to Topic**

| **Unit:2** | **Intensity Transformations** | **6 Hours** |
|---|---|---|

Basic intensity transformation techniques: Image negative, log transformation, power law transformation, piecewise
linear transformation, Histogram Equalization.

**Contemporary Issues related to Topic**

| **Unit:3** | **Spatial Domain Filtering** | **7 Hours** |
|---|---|---|

Mechanics of Spatial filtering, Smoothing spatial filters: Linear and Order statistic filters. Sharpening filters: Foundation, Laplacian and Gradient.

**Contemporary Issues related to Topic**

| **Unit:4** | **Image Restoration** | **6 Hours** |
|---|---|---|

Image Restoration: Image degradation/restoration process, noise model, restoration in presence of noise, periodic noise reduction.

**Contemporary Issues related to Topic**

| **Unit:5** | **Image Segmentation** | **7 Hours** |
|---|---|---|

Detection of discontinuities: Point, Line and Edge, Thresholding, Region based segmentation: Region Growing, Split and Merge.

**Contemporary Issues related to Topic**

| **Unit :6** | **Representation and Description** | **6 Hours** |
|---|---|---|

Representation, Simple Descriptor, Shape Number, Fourier Descriptor, Statistical Moments; Region Feature descriptor: Basic descriptor, Topological Descriptor, Texture Descriptor

**Contemporary Issues related to Topic**

| **Total Lecture Hours** | **39 Hours** |
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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Text books** | |
| **1** | R.C. Gonzalez & R.E. Woods, Digital Image Processing, 3nd/ 4th edition, PHI publication, 2009. |
| **2** | William K. Pratt, Digital Image Processing, 4th edition, A John Wiley & Sons, Inc., Publication, 2001. |
| **Reference Books** | |
| **1** | A. K. Jain, Fundamentals of Digital Image Processing, PHI publication. |
| **2** | S. Jayaraman, S. sakkirajan,T Veerakumar, Digital Image Processing, McGraw-Hill Publication. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/yccelibrary.html |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | http://nptel.iitm.ac.in/video.php?subjectId=117105079, |
| **2** | www.imageprocessingplace.com |

# V Semester
# 22ET551 – OE II: Fundamentals of Computer Networks

**Course Outcomes:**

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

1. Compare data transmission protocols and understand the applications of communication network
2. Apply the knowledge of LAN structure to design data communication system.
3. Detect Data transmission errors in communication networks.
4. Compare different data security protocols

| | | |
|---|---|---|
| **Unit:1** | **Computer Network and Internet** | **7 Hours** |
| Internet, the network edge, ISPs, Protocols, standards, standards of organizations<br><br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Link Layer and Local Area Networks** | **6 Hours** |
| Error detection and correction techniques, multiple access protocols, link layer addressing<br><br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Network Layer** | **7 Hours** |
| Network layer design issues, IP packets, IP addressing, virtual circuit and datagram networks, TCP and UDP<br><br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Transport Layer** | **6 Hours** |
| Transport layer design issues, transport service primitives, internet transport protocol TCP/IP architecture, TCP/IP protocol<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **Security in Communication Networks** | **7 Hours** |
| Network Security, cryptography, public key and private key cryptography<br><br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Application Layer** | **6 Hours** |
| HTTP, FTP, Email, DNS, WWW, POP3, IMAP<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | **Data Communication and Networking** Behrouz Forouzan Fifth Edition McGraw Hill |
| **2** | **Computer Networking A top down Approach Featuring and Internet** James F. Kurose Third Edition Pearson |
| **Reference Books** | |
| **1** | **Computer Networks** Andrew Tanenbaum Fourth Edition Prentice Hall PTR |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL course link Computer Networks and Internet Protocol Prof Soumya Kanti Ghosh & Prof Sandip |

# V Semester
# 22ET552 – OE II: Soft Computing

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|---|---|---|
| **Course Outcomes:** | | |
| **Upon successful completion of the course the students will be able to**<br>1. Identify and describe genetic operators and genetic algorithms in problem solving<br>2. Apply Neural Network algorithm for pattern classification<br>3. Apply fuzzy logic and arithmetic to handle uncertainty and solve engineering problems<br>4. Understand fuzzy rule base and fuzzy controller | | |
| **Unit:1** | **Genetic Algorithm** | **7 Hours** |
| Basic terminologies used in Genetic Algorithm, Simple GA, General Genetic Algorithm, Encoding, Selection, Crossover, Mutation, Stopping Condition for GA, Constraint in GA<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Neural Networks** | **6 Hours** |
| Biological Neurons and Their Artificial Models, Models of Artificial Neural Networks, Learning Methods, Activation Functions, McCulloch-Pitts Neuron Model, Neural Network Learning Rules, Application of NN<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Supervised Learning** | **7 Hours** |
| Single Layer Perceptron, Back propagation algorithm, Associative Memory<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Unsupervised learning** | **6 Hours** |
| Hamming and Max net, Competitive Learning, Self-organizing feature maps, ART Networks, RBF<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **Fuzzy Sets and Operations** | **7 Hours** |
| Concepts of Fuzzy sets, Extension Principle, Operation on fuzzy sets, Fuzzy numbers, Arithmetic operations, Lattice, Fuzzy equations<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Fuzzy logic and Systems** | **6 Hours** |
| Fuzzy relations, Fuzzy Logic, Approximate Reasoning Fuzzy controllers, Defuzzification Methods, Fuzzy Inference Techniques Applications, New topics to be announced time to time.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| | |
|---|---|
| **Textbooks** | |
| **1** | Soft Computing, 2011, Shivnandam, Wiley |
| **2** | Elements of Artificial Neural Network, 2009, K. Mehrotra, Penram |
| **3** | Fuzzy sets and Fuzzy logic, 2015, George Klir, Bo Yuan, Pearson |
| **Reference Books** | |
| **1** | Neural Networks, a comprehensive foundation, 1997, Simon Haykins, Person |
| **2** | Fuzzy Logic & Applications, 2011, T. Ross, Wiely |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://www.myreaders.info/html/soft_computing.html |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/106/105/106105173/ |

# V Semester
# 22ET553 – OE II: Microcontrollers & Embedded systems

**Course Outcomes:**

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

1. Elaborate 8051 microcontroller architecture.
2. Develop assembly and embedded C language program.
3. Interface 8051 microcontroller with different peripherals
4. Interface Arduino processor with different peripherals

| **Unit:1** | **7 Hours** |
|---|---|

Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview

**Contemporary Issues related to Topic**

| **Unit:2** | **6 Hours** |
|---|---|

Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs.

**Contemporary Issues related to Topic**

| **Unit:3** | **7Hours** |
|---|---|

I/O Interfacing such as LED, switches, 7segment display, keyboard matrix programming, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access

**Contemporary Issues related to Topic**

| **Unit:4** | **6 Hours** |
|---|---|

Timer programming in assembly and C: Various modes of operation, SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, 8051 connection to RS 232. Serial data transfer programs.

**Contemporary Issues related to Topic**

| **Unit:5** | **7 Hours** |
|---|---|

Interfacing of LCD, ADC, DAC, stepper motor and DC motor with 8051 microcontroller **.**

**Contemporary Issues related to Topic**

| **Unit :6** | **6 Hours** |
|---|---|

Block diagram of Arduino, features of Arduino Architecture, Arduino pin description: digital pins, analog pins, Power pins and other pins, Interfacing of LED, 7-Segment display, LCD, Sensors, DC motor, switch and Serial communication.

**Contemporary Issues related to Topic**

| **Total Lecture Hours** | **39 Hours** |
|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | The 8051 Microcontroller and Embedded systems using assembly & C, 2nd edition, Muhammad Ali Mazidi, Pearson Education Asia LPE |
| **2** | The 8051 Microcontroller, 3rd edition, CENGAGE Learning |
| **3** | Arduino Development Cookbook, Cornel Amariei, PACKT Publishing |
| **Reference Books** | |
| **1** | The 8051 Microcontroller, 3rd Edition, 2007,Kenneth Ayala,, Cengage |
| **2** | 8051 Microcontroller-Internals ,Instructions ,Programming & Interfacing, 2002,Ghoshal, Pearson Education India |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/108/105/108105102/ |

## V Semester
## 22ET554 – OE II: Fundamentals of Internet of Things

| | | |
|---|---|---|
| **Course Outcomes:** | | |
| **Upon successful completion of the course the students will be able to**<br>1. Explore the physical and Logical design of IoT.<br>2. Explore the M2M and NETCONF.<br>3. Explore python programming.<br>4. Apply basic skills of IoT to solve real life problems.<br>5. Illustrate IoT Security | | |
| **Unit:1** | **Introduction & Concepts:** | **5 Hours** |
| UNIT-1: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Sensing & Actuation** | **6 Hours** |
| Introduction to sensors & transducers, Introduction to electrodes & biosensors, Static and dynamic characteristics of sensors, Different types of sensors, Selection criteria's for sensors / transducers, Commercial IoT sensors / transducers, Signal conditioning modules of IoT system.<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **M2M & System Management with NETCONF-YANG** | **7 Hours** |
| M2M, Difference between IOT and M2M, SDN and NFV for IOT, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Developing Internet of Things & Logical Design using Python** | **7 Hours** |
| Introduction, IOT Design Methodology, Python Data Types & Data Structures, Control Flow, Functions , File Handling, Date/ Time Operations, IoT Device-Raspberry Pi, Programming Raspberry pi with Python<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **IoT Security** | **7 Hours** |
| Effect of security threats on user, authentication using OTP validation, Security Requirements for the Internet of Secure Things, Secure Solutions, Secure Framework of the IoT Related to Perceptual Layer, Challenges in IoT Security<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Domain Specific IOTs** | **7 Hours** |
| Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.<br>**Contemporary Issues related to Topic** | | |
| **Total LectureHours** | | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | Arshdeep Bahga and Vijay Madisetti , "Internet of Things, a hands on approach" , Universities Press (India)Pvt. Ltd. 2017, ISBN: 978-81-7371-954-7. |
| **Reference Books** | |
| **1** | Internet of Things : Technologies, Applications, Challenges and Solution B.K.Tripathy & J.Anuradha by CRC press publication |
| **2** | From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1 st Edition, Academic Press, 2014. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/UG%20COURSES/IIOT/IIOT%20(%20G%20Series).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/30.2019_Book_InternetOfThingsFromHypeToReal.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/106/105/106105166/ |
| **2** | https://onlinecourses.nptel.ac.in/noc21_ee85/preview |

Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

*(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)*

**(Accredited 'A++' Grade by NAAC with a score of 3.25)**

Hingna Road, Wanadongri, Nagpur - 441 110

# Bachelor of Technology

# SoE & Syllabus 2022

## 6th Semester

**(Department of Electronics & Telecommunication Engineering)**

## B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's

**Yeshwantrao Chavan College of Engineering**

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

**B.TECH SCHEME OF EXAMINATION 2022**

(Scheme of Examination w.e.f. 2022-23 onward)

**(Department of Electronics & Telecommunication Engineering)**

**B. Tech in Electronics & Telecommunication Engineering**

SoE No. 22ET-101

| SN | Sem | Type | BoS/ Deptt | Sub. Code | Subject | T/P | Contact Hours | | | | Credits | % Weightage | | | ESE Duration Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | T | P | Hrs | | MSEs* | TA** | ESE | |
| **Sixth Semester** | | | | | | | | | | | | | | | |
| 1 | 6 | PC | ET/ET | 22ET601 | Digital Signal Processing | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 2 | 6 | PC | ET/ET | 22ET602 | Lab:Digital Signal Processing | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 3 | 6 | PC | ET/ET | 22ET603 | Antennas & Wave Propagation | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 4 | 6 | PC | ET/ET | 22ET604 | Lab:Antennas & Wave Propagation | **P** | 3 | 0 | 0 | 3 | 1 | 30 | 20 | 50 | 3 Hours |
| 5 | 6 | PE | ET/ET | | **Professional Elective II** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 6 | 6 | PE | ET/ET | | **Lab: Professional Elective II** | **P** | 0 | 0 | 2 | 2 | 1 | | 60 | 40 | |
| 7 | 6 | PE | ET/ET | | **Professional Elective III** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 8 | 6 | OE-III | ET/ET | | **Open Elective - III **** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 9 | 6 | OE-IV | ET/ET | | **Open Elective - IV **** | **T** | 3 | 0 | 0 | 3 | 3 | 30 | 20 | 50 | 3 Hours |
| 10 | 6 | PR | ET/ET | 22ET605 | Project Phase I | **P** | 0 | 0 | 4 | 4 | 2 | | 60 | 40 | |
| | | | | | **TOTAL SIXTH SEM** | | **21** | **0** | **8** | **29** | **23** | | | | |

| **List of Mandatory Learning Course (MLC)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6 | HS | | MLC126 | YCCE Communication Aptitude Preparation (YCAP6) | | A | 3 | 0 | **0** | 3 | 0 |

**Professional Electives -II**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | PE II | PC | 22ET611 | PE II : Analog VLSI Design |
| 2 | 6 | PE II | PC | 22ET612 | PE II : Lab: Analog VLSI Design |
| 3 | 6 | PE II | PC | 22ET613 | PE II : Machine Learning |
| 4 | 6 | PE II | PC | 22ET614 | PE II : Lab : Machine Learning |
| 5 | 6 | PE II | PC | 22ET615 | PE II : Embedded System Design |
| 6 | 6 | PE II | PC | 22ET616 | PE II :Lab Embedded System Design |
| 7 | 6 | PE II | PC | 22ET617 | PE II : Multimedia Communication |
| 8 | 6 | PE II | PC | 22ET618 | PE II : Lab Multimedia Communication |
| 9 | 6 | PE II | PC | 22ET619 | PE II : Digital Image Analysis for Remote Sensing Application |
| 10 | 6 | PE II | PC | 22ET620 | PE II : Lab Digital Image Analysis for Remote Sensing Application |
| 11 | 6 | PE II | PC | 22ET621 | PEII: Radio Frequency Circuit Design |
| 12 | 6 | PE II | PC | 22ET622 | PEII:Lab Radio Frequency Circuit Design |

**Professional Electives -III**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | PE III | PC | 22ET641 | PE III : Introduction to Photonics |
| 2 | 6 | PE III | PC | 22ET642 | PE III : Wireless Mobile Communication |
| 3 | 6 | PE III | PC | 22ET643 | PE III : Soft Computing & Application |
| 4 | 6 | PE III | PC | 22ET644 | PE III : Power Electronics |
| 5 | 6 | PE III | PC | 22ET645 | PE III : Information Theory and coding |
| 6 | 6 | PE III | PC | 22ET646 | PE III : VLSI Testing and Verification |

**Open Electives -III**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | OE III | PC | 22ET661 | OE III : Principles of Communication |
| 2 | 6 | OE III | PC | 22ET662 | OE III : Industrial Automation |
| 3 | 6 | OE III | PC | 22ET663 | OE III :Medical Electronics |
| 4 | 6 | OE III | PC | 22ET664 | OE III : Fundamentals of Image Processing |

**Open Electives -IV**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | OE IV | PC | 22ET681 | OE IV :Fundamentals of Computer Networks |
| 2 | 6 | OE IV | PC | 22ET682 | OE IV :Soft Computing |
| 3 | 6 | OE IV | PC | 22ET683 | OE IV : Microcontrollers & Embedded systems |
| 4 | 6 | OE IV | PC | 22ET684 | OE IV : Fundamentals of Internet of Things |

**MSEs* = Three MSEs of 15 Marks each will be conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment**

**TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA**

**TA** = for Practical : MSPA will be 15 marks each**

| | | | |
|---|---|---|---|
| | | **June 2022** | **1.00** |
| **Chairperson** | **Dean (Acad. Matters)** | **Date of Release** | **Version** |

**Applicable for AY 2022-23 Onwards**

## VI Semester
## 22ET601 – Digital Signal Processing

**Course Outcomes:**

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

1. Apply discrete Fourier transform and fast Fourier transform on signals.
2. Implement digital filters in a variety of structures.
3. Design digital IIR and FIR filter.
4. Analyze the effects of finite word length on discrete time system.
5. Analyze multi-rate discrete time system with unequal sampling rates

| | | |
|---|---|---|
| **Unit:1** | **Discrete Fourier transform** | **7 Hours** |

Frequency domain sampling: DFT, DFT as Linear transformation, Properties of DFT, Circular convolution, Use of DFT in Linear Filtering, DFT of long sequences

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **FFT Algorithm** | **6 Hours** |

FFT algorithms: Decimation in time, Decimation in Frequency, Radix-2 , Radix-4

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Digital filter structures** | **7 Hours** |

Block diagram representation, Signal Flow Graph, Basic IIR structures, Basic FIR structures, IIR lattice structures, Linear Phase FIR, FIR lattice structure

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **IIR filter design** | **6 Hours** |

Bilinear transformation, Impulse invariant transformation, Low pass IIR digital filters, Butterworth and Chebyshev filter, Spectral transformations.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **FIR filter design** | **6 Hours** |

FIR filter design using windowing techniques (Rectangular, Hann, Hamm, Blackmann, Bartlett and Kaiser), Frequency sampling technique, Finite Word length Effect

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Multirate Digital Signal Processing** | **7 Hours** |

Basic sample rate alternation devices, Multirate structure for sampling rate conversion, Multirate Design of Decimator and Interpolator, The Ployphase Decomposition

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | "Digital Signal Processing - Principles, algorithms and applications" 4th edition, 2013 John G. Proakis McGraw-Hill |
| **2** | "Discrete time Signal Processing" 3rd edition 2010 Alan Oppenheim, Ronald Schafer and Buch Pearson |
| **3** | "Digital Signal Processing - A computer based approach," Publication. 4th edition, 2013 Sanjit K. Mitra, McGraw-Hill |
| **Reference Books** | |
| **1** | Digital Signal Processing 3rd Edition 2017 S Salivahanan A Vallavraj C Gnanapriya McGraw-Hill |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/117/102/117102060/ |

## VI Semester
## 22ET602 –Lab Digital Signal Processing

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Apply discrete Fourier transform and fast Fourier transform on signals.<br>2. Implement digital filters in a variety of structures.<br>3. Design digital IIR and FIR filter.<br>4. Analyze the effects of finite word length on discrete time system.<br>5. Analyze multi-rate discrete time system with unequal sampling rates |

| Sr. No. | Experiments based on |
|---|---|
| 1 | To find Discrete Fourier Transform and Inverse Discrete Fourier Transform of discrete time signals |
| 2 | Verify the properties of DFT (Linearity, Time Reversal and Parsevals theorem) |
| 3 | To find circular convolution of two discrete time signals |
| 4 | To verify Circular time shift and Frequency shift Property |
| 5 | To design Butterworth IIR filters. |
| 6 | To design Chebyshev IIR filters. |
| 7 | To design FIR filters using windowing techniques |
| 8 | To Analyze Coefficient Quantization Effect |
| 9 | To Design Decimator |
| 10 | To design Interplotor |

## VI Semester
## 22ET603 – Antennas & Wave Propagation

**Course Outcomes:**

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

1. To understand the basic terminology and evaluate various parameters of antennas.
2. Analyse performance parameters of various antennas & antenna array.
3. Perform antenna measurements using different antenna measurement techniques.
4. Design and Analyse various antennas
5. Aware of the wave spectrum and respective band based antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.

| **Unit :1** | **ANTENNA FUNDAMENTALS** | **7 Hours** |
|---|---|---|

Concepts of Propagation and types of propagations, Introduction to antenna , need of Antenna, Types of antennas, Radiation mechanism of single wire and two wire , Radiation Pattern, Antenna field zones, Beam solid angle, radiation power density , radiation intensity, Directivity, Gain, Antenna efficiency, Beam efficiency, Polarization, impedance, bandwidth.

**Contemporary Issues related to Topic**

| **Unit:2** | **LINEAR WIRE ANTENNAS** | **6 Hours** |
|---|---|---|

Vector potentials for electric current source, Vector potentials for Magnetic current source, Infinitesimal Dipole, Finite dipole, Half wavelength dipole.

**Contemporary Issues related to Topic**

| **Unit:3** | **ANTENNA ARRAYS** | **7 Hours** |
|---|---|---|

Two element array, N-element linear array with uniform amplitude and spacing, N-element array uniform spacing, Non-uniform amplitude**,** Binomial Array, Yagi - Uda array of linear Elements, broad side, end fire, phase array.

**Contemporary Issues related to Topic**

| **Unit:4** | **HF, VHF, UHF AND MICROWAVE ANTENNAS** | **6 Hours** |
|---|---|---|

Concept of Resonant and Non resonant antenna, Linear wire antenna , V antenna, Rhombus, Reflector antenna, Helical Antennas – basic properties; Design considerations for helical antennas in Axial Mode and Normal Modes, Whip antenna.

**Contemporary Issues related to Topic**

| **Unit:5** | **Special Antennas** | **7 Hours** |
|---|---|---|

Babinet's principle, Rectangular Horn antenna, conical horn **,** Introduction to Microstrip Antenna , its types , Feeding network of patch antenna, Rectangular patch, Microstrip array and its feed network

| Unit:6 | Measurement techniques | 6 Hours |
|---|---|---|
| Antenna Range- reflection and the free-space ranges - Elevated ranges, Slant ranges, Anechoic chambers, Compact ranges, Near-field ranges, , NF/FF method and its types, Radiation Pattern measurement system , Gain Measurement, Impedance measurement, current measurements<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39Hours** |

| **Textbooks** | |
|---|---|
| **1** | Antenna Theory - C.A. Balanis, John Wiley and Sons |
| **2.** | Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan,Tech India Publications, New Delhi, 2001. |
| **Reference Books** | |
| **1** | Antennas – John D. Kraus, McGraw-Hill, |
| **2** | Antennas and Radio Propagation- R.E. Collins, McGraw-Hill |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://link.springer.com/openurl?genre=book&isbn=978-1-4419-5338-4 |
| **2** | http://link.springer.com/openurl?genre=book&isbn=978-1-4757-2760-9 |
| **3** | http://link.springer.com/openurl?genre=book&isbn=978-1-4614-7998-7 |
| **4** | http://link.springer.com/openurl?genre=book&isbn=978-0-7923-7241-7 |
| **5** | http://link.springer.com/openurl?genre=book&isbn=978-1-4020-8417-1 |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/108101092 |

## VI Semester
## 22ET604 –Lab Antennas & Wave Propagation

**Course Outcomes:**

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

1. To understand the basic terminology and Evaluate various parameters of antennas.
2. Analyze performance parameters of various antennas & antenna array.
3. Perform antenna measurements using different antenna measurement techniques.
4. Design and Analyze various antennas
5. Aware of the wave spectrum and respective band based antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.

| Sr. No. | Experiments based on |
|---|---|
| 1 | To design and Simulate Patch Antenna with Probe Feed using Simulation software. |
| 2 | To performed parametric analysis of Patch Antenna using Simulation software. |
| 3 | To design and Simulate Patch Antenna with Microstrip Feed line using Simulation software. |
| 4 | To design and Simulate Lambda/2 Dipole Antenna using Simulation software and study it's Characteristic. |
| 5 | To design and Simulate Yagi-Uda Antenna using Simulation software and study it's Characteristic. |
| 6 | To design and Simulate Horn Antenna using Stimulation software and study it's Characteristic. |
| 7 | To design and Simulate parabolic Reflector using Stimulation software and study it's Characteristic. |
| 8 | To measure radiation Pattern of Yagi-Uda Antenna and its Characteristic using Antenna trainer Kit. |
| 9 | Measurement of Antenna Parameter Using Vector Network Analyser. |
| 10 | Mini Project on antenna. |

# VI Semester
# 22ET605 – Project Phase I

# VI Semester
# 22ET611 – PE II: Analog VLSI Design

**Course Outcomes:**

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

1. Analyze small signal model of MOS transistor &Perform analysis of single stage amplifiers with or without load.
2. Analyze small signal parameters of Differ Amplifier.
3. Analyze Performance parameters of CMOS op amp.
4. Analyze Performance parameters of converters

| | | |
|---|---|---|
| **Unit:1** | **Basic MOS Device Physics** | **7 Hours** |

Threshold voltage, Derivation of I/V characteristics, second order effects, MOS device capacitance, MOS small signal models, MOS SPICE models

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **Single stage amplifiers** | **6 Hours** |

Basic concept, common source, common source stage with resistive load, CS stage with source degeneration, source follower, common gate.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Differential amplifiers** | **7Hours** |

Single ended & differential operation, Basic differential pair, qualitative and quantitative analysis, Common mode response

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Operational amplifiers** | **6 Hours** |

Performance parameters, one stage op amp, Gain boosting, Noise in op amp

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **ADC converter and DAC converter** | **7 Hours** |

Converting Analog Signals to Digital Signals, Sample and-Hold (S/H) Characteristics, Digital to Analog Converter (DAC) Specifications Analog -to-Digital Converter (ADC) Specifications

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Sigma Delta Converter** | **6 Hours** |

The Oversampling ADC, The First-Order Sigma Delta Modulator, The Higher Order Sigma Delta modulator

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39 Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| 1 | Design of Analog CMOS Integrated Circuits, Nineteenth reprint2010, Behzad Razavi, Mc-Graw-Hill |
| **Reference Books** | |
| 1 | CMOS circuit design, layout, and Simulation', Second edition, reprint 2009, Jacob Baker,WSE |
| 2 | CMOS Analog Circuit Design, second edition, 2010, P.E.Allen, D.R.Holdberg, Oxford univ. press |
| 3 | Analysis and Design of Analog Integrated Circuits, fifth edition, reprint 2010, Paul B Gray , Hurst , Lewis, Meyer, John Wiley & sons |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/14.Analog%20Design%20for%20CMOS%20VLSI%20Systems%20-%20(Franco%20Maloberti).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/117/101/117101105/ |
| **2** | https://archive.nptel.ac.in/courses/117/108/117108038/ |

## VI Semester
## 22ET612 – PE II: Lab Analog VLSI Design

**Course Outcomes:**

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

1. Analyze small signal model of MOS transistor &Perform analysis of single stage amplifiers with or without load.
2. Analyze small signal parameters of Differ Amplifier.
3. Analyze Performance parameters of CMOS op amp.
4. Analyze Performance parameters of converters

| Sr. No. | Experiments based on |
|---|---|
| 1 | NMOS characteristic :- Vds Vs ID for various values of Vgs. |
| 2 | PMOS characteristic :- Vds Vs ID for various values of Vgs. |
| 3 | Common Source amplifier:- AC analysis Transient analysis |
| 4 | Common Drain amplifier:- AC analysis Transient analysis |
| 5 | Differential Amplifier :- AC analysis Transfer curve (Vin Vs Vout, DC condition) |
| 6 | Op-Amp Design: AC analysis Transient analysis DC analysis |
| 7 | SPICE simulation of basic Analog circuits, Analog Circuit simulation Verification of layouts. |
| 8 | Basic CMOS Comparator Design |
| 9 | Source Coupled Pair Differential Amplifier |
| 10 | Analysis of ADC, DAC , Sigma delta Convertor . |

# VI Semester
# 22ET613 – PE II : Machine Learning

**Course Outcomes:**

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

1) Apply and analyze the model using regression.
2) Apply and evaluate the performance of system for classification.
3) Apply Supervised and unsupervised learning for problem solving.
4) Apply neural network algorithms for classification.
5) Describe and evaluate deep neural network with computational complexity

| | | |
|---|---|---|
| **Unit:1** | **Regression** | **6 Hours** |

Supervised and Unsupervised Learning, Regression, Model and Cost Function, Gradient Descent, Multivariate Linear Regression, Feature Scaling, Gradient Descent for multivariable

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **Classification** | **7 Hours** |

Classification, Hypothesis Representation, Decision Boundary, Cost function and Gradient Descent, Multi-classification, Regularization, Model Evaluation

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Supervised Learning** | **7 Hours** |

KNN, SVM, Decision tree, Naive Bayes Classifiers, Random Forest

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **Unsupervised learning** | **6 Hours** |

K-means clustering, Hierarchical Clustering, DBSCAN Clustering, , Recommender System, Anomaly Detection

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **Artificial Neural Network** | **7 Hours** |

Introduction to neural network, Activation Functions, Perceptron rule, Backpropagation network

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **Deep Learning** | **6 Hours** |

Introduction to deep learning, building blocks of CNN, Computational Complexity, Case studies based on CNN architectures : Alexnet, Lenet, VGG Net

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39Hours** |

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997. |
| **Reference Books** | |
| **1** | Introduction to Machine Learning Edition 2, by Ethem Alpaydin |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://onlinecourses.nptel.ac.in/noc22_cs73/preview |
| **2** | https://onlinecourses.nptel.ac.in/noc22_cs97/preview |

## VI Semester

## 22ET614– PE II : Lab Machine Learning

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1) Apply and analyze the model using regression.<br>2) Apply and evaluate the performance of system for classification.<br>3) Apply Supervised and unsupervised learning for problem solving.<br>4) Apply neural network algorithms for classification.<br>5) Describe and evaluate deep neural network with computational complexity |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Data Analysis |
| 2 | Prediction task using Linear Regression |
| 3 | Classification task using Logistic Regression |
| 4 | K Nearest Neighbour Classifier |
| 5 | Decision Tree |
| 6 | Support Vector Machine |
| 7 | Naïve Bays algorithm |
| 8 | K means Clustering |
| 9 | Recommender System |
| 10 | CNN |

## VI Semester
## 22ET615 – PE II : Embedded System Design

**Course Outcomes:**

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

1. Explore the architectural features of ARM processors
2. Apply ARM instruction set in developing C-language programs.
3. Explore various versions of ARM processor and memory buses associated.
4. Develop programs in interfacing of different peripherals with ARM processors
5. Elaborate the concept of real time systems
6. Identify, design and implement applications-based Arduino system.

| **Unit:1** | Introduction to Different Processors | **7 Hours** |
|---|---|---|

Introduction to embedded system and ARM Processor Difference between RISC & CISC, Advantages of architectural features of ARM Processor, Processor modes, Register Organization, Exceptions and its handling. 3/5- stage pipeline ARM organization. LPC2148 ARM 7 microcontroller, Features of LPC2148, Block diagram of LPC2148.

**Contemporary Issues related to Topic**

| **Unit:2** | Instruction Sets | **7 Hours** |
|---|---|---|

Memory and memory-mapped I/Os ARM and THUMB instruction sets, ARM programmer's model, addressing modes, Instruction set in detail and programming, data processing instruction, data transfer instruction, Control flow instructions, simple assembly language programs

**Contemporary Issues related to Topic**

| **Unit:3** | Architectures | **7 Hours** |
|---|---|---|

ARM floating point architecture and DSP extensions ARM floating point architecture and DSP extensions, ARM co-processors. ARM 9 TDMI ARCHITECTURAL STUDY: - H/W architecture, Timing diagrams for various accesses, Memory buses: AMBA, ASB, & APB. Architectural support for system development.

**Contemporary Issues related to Topic**

| **Unit:4** | Introduction of different services in Arduino | **6 Hours** |
|---|---|---|

Basic embedded C programs Basic embedded C programs for GPIO and interfacing of different devices like LED, LCD. Introduction to NODE MCU ESp8266 and ESP 32, NODE MCU ESP8266 Features & Using It with Arduino IDE, NODE MCU ESP8266 Pinout, Power requirement.

**Contemporary Issues related to Topic**

| **Unit:5** | Memory | **7 Hours** |
|---|---|---|

memory Management Memory Hierarchy, memory size and speed, on-chip memory, caches, cache design, memory management

**Contemporary Issues related to Topic**

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|---|---|---|---|---|---|
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| **Unit :6** | RTOS | **7 Hours** |
|---|---|---|
| Architectural Support of Operating System Introduction of RTOS, RTOS issues, The shared Data Problem, Software Architectures (Round Robin, Round Robin with Interrupts, Function Queue Scheduling,) Selecting a software Architecture, Case for Real Time Operating System, Introduction to RTOS: tasks and task states, tasks and data, semaphores and shared data, message queues, mailboxes and pipes, events, RT Linux.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

| **Textbooks** | |
|---|---|
| **1** | Brian Evans, Beginning Arduino Programming (Technology in Action) , 2nd Edition, Apress; 1st ed. edition (2 October 2011) |
| **Reference Books** | |
| **1** | J. M. Hughes, Arduino: A Technical Reference , 3rd Edition, O'Reilly Media, Inc. |
| **2** | Michael J. Pont , "Embedded C", Pearson Education, 2nd Edition, 2008 |
| **3** | Simon Monk, Programming Arduino: Getting Started with Sketches , 2nd Edition, O'Reilly Media, Inc. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | https://link.springer.com/book/10.1007/978-981-16-2761-3 |
| **2** | https://link.springer.com/book/10.1007/978-981-16-9781-4 |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://link.springer.com/book/9789811922541 |
| **2** | https://link.springer.com/book/10.1007/978-3-030-92968-8 |
| **3** | https://nptel.ac.in/courses/127/105/127105007 |

## VI Semester
## 22ET616 – PE II : Lab Embedded System Design

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Explore the architectural features of ARM processors<br>2. Apply ARM instruction set in developing C-language programs.<br>3. Explore various versions of ARM processor and memory buses associated.<br>4. Develop programs in interfacing of different peripherals with ARM processors<br>5. Elaborate the concept of real time systems<br>6. Identify, design and implement applications-based Arduino system. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | Swap contents of two memory locations. |
| 2 | Add 16 bit and 32 bit numbers in memory locations. |
| 3 | Toggle LED connected to port pin of Atmega 328 |
| 4 | Display message on LCD using Atmega 328 |
| 5 | Serial communication using UART of Atmega 328 |
| 6 | Generate square wave using DAC of Atmega 328 |
| 7 | Toggle LED connected to port of Atmega 328. Genrate time delay using timer. |
| 8 | Interfacing ADC with Atmega 328 |
| 9 | Interfacing Wi-Fi module with Atmega 328 |
| 10 | Mini Project |

## VI Semester
## 22ET617– PE II : Multimedia Communication

| | | |
|---|---|---|
| **Course Outcomes:** | | |
| **Upon successful completion of the course the students will be able to**<br>1. Explain the fundamental concepts of multimedia systems<br>2. Elaborate image, audio and video compression techniques<br>3. Implement Wavelet based image compression techniques<br>4. Illustrate various multimedia network protocols<br>5. Explain concepts of image retrieval from digital libraries | | |
| **Unit:1** | | **7 Hours** |
| Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video | | |
| **Contemporary Issues related to Topic** | | |
| **Unit:2** | | **6 Hours** |
| Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio | | |
| **Contemporary Issues related to Topic** | | |
| **Unit:3** | Multimedia data compression: Lossless compression algorithm: DCT, Wavelet- Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT), Basic Audio Compression Techniques | **7 Hours** |
| **Contemporary Issues related to Topic** | | |
| **Unit:4** | Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, MPEG2, MPEG4 | **6 Hours** |
| **Contemporary Issues related to Topic** | | |
| **Unit:5** | Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications :Quality of Multimedia Data Transmission, Multimedia over IP, RTCP,RTP,SIP Transport of MPEG-4,DMIF, Media-on-Demand(MOD) ,Multimedia Broadcasting schemes | **7Hours** |
| **Contemporary Issues related to Topic** | | |
| **Unit :6** | Content-Based Retrieval in Digital Libraries C-BIRD— A Case Study ,C-BIRD GUI Color Histogram Color Density Color Layout Texture Layout Search by Illumination Invariance Search by Object Model | **6 Hours** |
| **Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

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|---|---|
| **Textbooks** | |
| **1** | Fundamentals of Multimedia, Ze-Nian Li , Mark S Drew,2004, PHI/Pearson Education Publication |
| **Reference Books** | |
| **1** | Multimedia Applications, Steinmetz, Nahrst,2004, Springer Publication |
| **2** | Multimedia Communications: Applications, Networks, Protocols and Standars, Fred Halsall,2001, Addison-Wesley |
| **3** | Multimedia Systems ,Ralf Steinmetz and Klara Nahrstedt , Springer. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | |

## VI Semester
## 22ET618– PE II :Lab Multimedia Communication

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Explain the fundamental concepts of multimedia systems<br>2. Elaborate image, audio and video compression techniques<br>3. Implement Wavelet based image compression techniques<br>4. Illustrate various multimedia network protocols<br>5. Explain concepts of image retrieval from digital libraries |

| Sr. No. | Experiments based on |
|---|---|
| 1. | Convert given image from one color model to another using MATLAB functions and conversion formulae |
| 2. | Implement Delta modulation and ADM |
| 3. | Implement DCT image compression scheme. |
| 4. | Convert given image to its dithered version using 2X2 dithered matrix**.** |
| 5. | Implement the concept of Chroma Subsampling. |
| 6. | Implement EZW encoder on given 4X4 matrix of Wavelet coefficient. |
| 7. | Implement SPIHT encoder on given 4X4 matrix of Wavelet coefficient. |
| 8. | Obtain motion vector using Sequential Search method |
| 9. | Play video file and display any two frames from video. |
| 10. | Implement the concept of Histogram matching |

## VI Semester
## 22ET619– PE II : Digital Image Analysis for Remote Sensing Application

| **Course Outcomes:** | | |
|---|---|---|
| **Upon successful completion of the course the students will be able to**<br>1. Elaborate image charactesistics and analysis methods for remote sensing.<br>2. Apply the image enhancement, transforms and correction techniques on remote sensing images.<br>3. Apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods. | | |
| **Unit:1** | **Review of Remote Sensing Concepts** | **7 Hours** |
| Spatial and radiometric characteristics – spectral and temporal characteristics, Optical Radiation Model: The wave/ particle models - energy/matter interaction – Radiometric Correction–Atmospheric Correction, Introduction to GIS.<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Digital Image Formation & Characteristics** | **6 Hours** |
| Point spread functions – sampling and quantization, Univariate and multivariate image statistics – noise models- power spectral density- co-occurrence matrix<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Image Enhancement and Spectral Transforms** | **7 Hours** |
| contrast enhancement – band rationing – principal component analysis – vegetation transforms – texture transforms, Spatial Transforms: convolution concept - low and high pass filtering – spatial transformations –Fourier transform – wavelet transforms.<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Geometric Correction** | **6 Hours** |
| Sensor geometry and empirical models for geometric corrections<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **Thematic Information Extraction** | **7 Hours** |
| review of supervised and unsupervised Image classification – Maximum Likelihood and Bayesian classification, Non-parametric & parametric classification, Introduction of Microwave Remote Sensing and Applications in Disaster Management<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Subpixel classification & Hyperspectral Image Analysis** | **6 Hours** |
| Linear mixing model, fuzzy set classification, Hyperspectral Image Analysis: Feature extraction, classification algorithms for hyperspectral data<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39Hours** |

| | | | | | |
|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
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| | |
|---|---|
| **Textbooks** | |
| **1** | Remote Sensing: Models and Methods for Image Processing, Third Edition, Robert A. Schowengerdt Elsevier |
| **2** | Remote Sensing Digital Image Analysis, 4th Edition, John A. Richards, Xiuping Jia, Springer |
| **Reference Books** | |
| **1** | Introductory Digital Image Processing: A Remote Sensing Perspective, Second Edition, Jhon R. Jensen<br>Pearson Series |
| **2** | Physical Principles of Remote Sensing, Third Edition, W.G. Rees, Cambridge University Press |
| **3** | James B. Campbell and Randolph H. Wynne, "Introduction to Remote Sensing", (5th Ed.), The Guildford Press, New York, 2012 |
| **4** | Lillesand, T.M., Kiefer, R.W. and Chapman, J.W., "Remote Sensing and Image Interpretation", (5th Ed.), John Wiley & Sons, 2007 |
| **5** | Gonzalez, Rafael C. and Richard E. Woods "Digital Image Processing", (3rd Edition) Pearson Education, London |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://link.springer.com/openurl?genre=book&isbn=978-1-4419-8166-0 |
| **2** | http://link.springer.com/openurl?genre=book&isbn=978-94-010-7501-5 |
| **3** | http://link.springer.com/openurl?genre=book&isbn=978-3-540-79352-6 |
| **4** | http://link.springer.com/openurl?genre=book&isbn=978-3-662-00522-4 |
| **MOOCs Links and additional reading, learning, video material** | |
| **1.** | https://nptel.ac.in/courses/105107160 |
| **2.** | https://onlinecourses.nptel.ac.in/noc19_ce38/preview |
| **3.** | https://archive.nptel.ac.in/courses/105/107/105107160/ |
| **4.** | https://elearning.iirs.gov.in/syllabus_structure.html |

## VI Semester
## 22ET620– PE II : Lab Digital Image Analysis for Remote Sensing Application

**Course Outcomes:**

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

1. Elaborate image charactesistics and analysis methods for remote sensing.
2. Apply the image enhancement, transforms and correction techniques on remote sensing images.
3. Apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods.

| Sr. No. | Experiments based on |
|---|---|
| 1. | Satellite Data Loading and conversion in different Formats |
| 2. | Image rectification using different geometric models |
| 3. | Image Enhancementof Multispectral and Panchromatic data and Plotting |
| 4. | SPATIAL FILTERINGof Satellite data |
| 5. | Band ratioing, NDVI and topographic corrections |
| 6. | IMAGE CLASSIFICATION: Supervised, Unsupervised |
| 7. | IMAGE FUSION TECHNIQUESand Pan-Sharpening |
| 8. | Different satellite data and its Multispectral Images(High Resolution , Mid Resolution, Coarse Resolution Satellite Data) ( Maxar, AIRBUS, LANDSAT, Thematic Mapper, IRS, RISAT, Radarsat) |
| 9. | Vegetation Maps, Density Slice, and Masks |
| 10. | Principal Componentsanalysis , Mosaicking |
| 11. | Change Detectionof different seasons data |
| 12. | Introduction to Image Analysis with ArcGIS 10/ ERDAS Imagine image processing software package/ QGIS |

## VI Semester

## 22ET621– PE II : Radio Frequency Circuit Design

**Course Outcomes:**

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

1. Analyze the behavior of series and parallel RLC circuit at High Frequency.
2. Elaborate the MOSFET based circuit design and different bandwidth estimation techniques.
3. Design high frequency amplifier for RF applications.
4. Explain biasing of RF circuit.
5. Design RF power amplifiers and phase detectors.

| | | |
|---|---|---|
| **Unit:1** | **Fundamentals of RF Circuits** | **7 Hours** |

Introduction, History of wireless Communication, Non cellular wireless Applications, Propagation, Parallel RLC Tank Circuit, Series RLC Circuit , RLC Network as Impedance Transformer, Skin Effect, Resistor, Capacitor, Inductor.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:2** | **MOSFET and Transmission Lines** | **6 Hours** |

MOSFET Physics, MOS Device Physics in Short Channel Regime , Other Effects, Link Between Lumped and Distributed Regime ,Driving Point impedance at iterated structures , Transmission line , Behaviour of finite length Transmission line.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:3** | **Bandwidth Estimation** | **7Hours** |

Review of Smith Chart and S-Parameter, Application of smith chart, Rise time, Delay, Bandwidth Estimation Techniques - Open Circuit Time Constant, Short Circuit Time constant.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:4** | **HF RF Amplifier and Bandwidth Detection** | **6 Hours** |

Introduction to High Frequency Amplifier Design, Zeros as Bandwidth Enhancer , The shunt series Amplifier, Tuned Amplifiers, Neutralization and Unilateralization Cascaded Amplifiers.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit:5** | **Biasing of RF Circuit** | **7 Hours** |

Introduction to Voltage references and Biasing, Review of Diode Behavior, Diodes and Bipolar transistors in CMOS Technology Supply independent bias circuits, Band gap Voltage References, Amplifier linearity.

**Contemporary Issues related to Topic**

| | | |
|---|---|---|
| **Unit :6** | **RF Power Amplifier and Phase Detectors** | **6 Hours** |

Introductions to RF Power Amplifiers, Classification of Power Amplifiers, Modulation of Power Amplifiers, Introduction to Phase lock loops , Linear zed PLL Model, Phase Detector, Sequential Phase Detector, Loop Filters and Charge Pumps.

**Contemporary Issues related to Topic**

| | |
|---|---|
| **Total Lecture Hours** | **39 Hours** |

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | The Design of CMOS Radio Frequency Integrated Circuits, 2nd Edition, Thomas H. Lee, Cambridge University Press. |
| **2** | RF Circuit Design Theory and Applications, 2nd Edition, R. Ludwig & P. Bretchko, Pearson Publication. |
| **Reference Books** | |
| **1** | Analysis and Design of Analog Integrated Circuits, 4th Edition, Paul R. Gray, Whiley India Publication. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/43.design%20of%20analog%20cmos%20integrated%20circcuits.pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/81.microwave-devices-and-circuits-samuel-liao.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL Course on CMOS RF Integrated Circuits by Dr. S. Chatterjee, IIT Delhi, https://www.youtube.com/playlist?list=PLbMVogVj5nJQdGDSx243YPnNeLMBrhNE8 |

## VI Semester
## 22ET622– PE II : Lab Radio Frequency Circuit Design

| **Course Outcomes:** |
|---|
| **Upon successful completion of the course the students will be able to**<br>1. Analyze the behavior of series and parallel RLC circuit at High Frequency.<br>2. Elaborate the MOSFET based circuit design and different bandwidth estimation techniques.<br>3. Design high frequency amplifier for RF applications.<br>4. Explain biasing of RF circuit.<br>5. Design RF power amplifiers and phase detectors. |

| Sr. No. | Experiments based on |
|---|---|
| 1 | To import a Touchstone format data file and use it in simulations. |
| 2 | To design differential Amplifier. |
| 3 | To design the CMOS mixer. |
| 4 | To design the series RLC circuit. |
| 5 | To design parallel RLC circuit. |
| 6 | To design L-C Filter (Low Pass Filter by using lumped element). |
| 7 | To design of power BJT amplifier. |
| 8 | To design CLC circuit. |
| 9 | To design RF oscillator. |
| 10 | To design Power Amplifier for WiMAX Applications. |

## VI Semester
## 22ET641– PE III : Introduction to Photonics

| | | |
|---|---|---|
| **Course Outcomes:** | | |
| **Upon successful completion of the course the students will be able to**<br>1. | | |
| **Unit:1** | | **7 Hours** |
| Science of light – evolution, ray/wave/statistical/quantum optics Wave phenomena – Interference, Diffraction<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | | **6 Hours** |
| Statistical properties of light – Coherence. What are photons? Photon properties - energy, flux, statistics<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | | **6 Hours** |
| Interaction of photons with atoms Light amplification<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | | **7 Hours** |
| Laser fundamentals, Semiconductor junction characteristics<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | | **7 Hours** |
| Semiconductor light sources Semiconductor light detectors<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | | **6 Hours** |
| Interaction of light with RF and acoustic waves .Nonlinear optics<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |
| **Textbooks** | | |
| **1** | Fundamentals of Photonics, Saleh & Teich. | |
| **Reference Books** | | |
| **1** | Photonics An Introduction, Georg A. Reider, Springer link | |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | | |
| **1** | | |
| **MOOCs Links and additional reading, learning, video material** | | |
| **1** | https://archive.nptel.ac.in/courses/108/106/108106135/ | |

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

## VI Semester
## 22ET642– PE III : Wireless Mobile Communication

**Course Outcomes:**

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

1. Describe various generations of mobile communications and apply the concept of frequency reuse for design of cellular system.
2. Quantify causes and effects of path loss and signal fading on received signal characteristic and used various technique to improve signal quality.
3. Describe various types of equalization and diversity technique & Multiple access techniques for wireless communication..
4. Analyze GSM & Multiple access Technique and Understand the fundamentals of wireless networking

| **Unit:1** | **Introduction to Wireless Communication Systems & Cellular Concept** | **7 Hours** |
|---|---|---|

Evolution of Mobile Radio communication, Introduction to wireless networks, Differences Between Wireless & Fixed Telephone Networks, Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, Trunking and grade of service, improving capacity in cellular system.

**Contemporary Issues related to Topic.**

| **Unit:2** | **Mobile Radio Propagation:** Large Scale Path Loss | **7 Hours** |
|---|---|---|

Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, Reflection, Ground Reflection (2-ray) Model, Diffraction, Scattering, Practical Link Budget Design Using Path Loss Models, Outdoor Propagation Models.

**Contemporary Issues related to Topic**

| **Unit:3** | **Mobile Radio Propagation: Small-Scale Fading and Multi path** | **7 Hours** |
|---|---|---|

Small-Scale Multipath Propagation: Factors Influencing Small-Scale Fading, Factors Influencing Small-Scale Fading, Doppler Shift, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels. Types of Small Scale Fading, Rayleigh and Ricean Distributions, Statistical Models for Multi path Fading Channels.

| **Unit:4** | **Equalization & Diversity:** | **6 Hours** |
|---|---|---|

Fundamentals of equalization, Equalizers in communication receiver, Survey of equalizer Technique, space diversity, polarization diversity, frequency and time diversity, RAKE Receiver .

**Contemporary Issues related to Topic**

| **Unit:5** | **GSM** | **7 Hours** |
|---|---|---|

Introduction to Multiple Access Technique, GSM - global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing in GSM, introduction to CDMA digital cellular standard (IS-95), Routers 901, 920 and Switches, Case studies on latest Generation.

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| **Contemporary Issues related to Topic** | | |
| **Unit:6** | **Wireless Networking:** | **6 Hours** |
| Development of wireless networks, Traffic routing in wireless networks, Wireless data services, Common channel signalling, Signalling System No7. An Example of SS7, introduction to various generation of mobile communication. Wi-max Technology, Unlicensed Band Radio (UBR), Case studies on latest wireless data Networks.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | Wireless Communication Principlesand practice (2nd Edition), T. S.Rappaport, (Prentice Hall PTR, upper saddle river, New Jersey.) |
| **Reference Books** | |
| **1** | Wireless digital communication, KamiloFeher,PHI 1995 |
| **2** | Mobile Communications Design fundamentals, William C. Y. Lee, John Willey 1993 |
| **3** | Mobile Cellular Communication, W .C .Y. Lee, 2005 McGraw Hill |
| **4** | The Mobile Radio Propagation channel, J.D. Parson, 1996 John Willey |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Rappaport%20-%20Wireless%20Communications,Principles%20and%20Practice-ISBN%200130422320.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://www.digimat.in/nptel/courses/video/106106167/L01.html |

## VI Semester
## 22ET643– PE III : Soft Computing & Application

**Course Outcomes:**

At the completion of this course, student will be able to

1. Examine fuzzy logic, neural network and deep learning models
2. Apply fuzzy logic for solving problems.
3. Apply supervised/unsupervised algorithms for pattern recognition
4. Analyze the concepts of deep learning models for computer vision analysis

| Unit:1 | Fuzzy Logic & Arithmetic Operations | 7 Hours |
|---|---|---|

Introduction to soft computing, Applications of Soft Computing, Operations on Fuzzy Sets, Membership Functions, fuzzy compliments, t-norms and t-conorm, extension principle, Fuzzy arithmetic operation on intervals and on fuzzy sets, lattice of fuzzy numbers, fuzzy equations, Problems

**Contemporary Issues related to Topic**

| Unit:2 | Fuzzy Relations & Decision Making | 7 Hours |
|---|---|---|

Fuzzy relations, projections and cylindric extensions, binary fuzzy relations, fuzzy equivalence, Fuzzy Rules and Fuzzy Reasoning, Fuzzy implications, Fuzzy Inference Systems, Fuzzy Decision Making, Fuzzy controllers, applications of Fuzzy logic, Problems

**Contemporary Issues related to Topic**

| Unit:3 | Neural Network Concepts | 6Hours |
|---|---|---|

Introduction to Biological neural network, and Artificial Neuron Models, Neural Network learning rules, NN architectures, single and multilayer Perceptron training algorithm, ADALINE, MADALINE NN, Problems

**Contemporary Issues related to Topic**

| Unit:4 | Supervised Neural Networks | 6 Hours |
|---|---|---|

Supervised Learning Neural Networks, Backpropagation algorithm, factors affecting back propagation training, Radial Basis Function Networks, Recurrent Networks, Adaptive Multilayer NN, Problems

**Contemporary Issues related to Topic**

| Unit:5 | Unsupervised Neural Networks | 7 Hours |
|---|---|---|

Unsupervised Learning Neural Networks, Winner take networks, Adaptive Resonance architectures, Self- Organizing Map, Associate memory models, Applications of ANNs to solve some real life problems, Problems

**Contemporary Issues related to Topic**

| Unit:6 | Deep learning | 7 Hours |
|---|---|---|

Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Basic structure of Convolutional Network, Case studies: Alex net, VGGNet, GoogLeNet, Applications of CNN: Train deep neural networks for computer vision tasks, Applications of Soft computing to solve problems in varieties of application domains, Problems

**Contemporary Issues related to Topic**

| Total Lecture Hours | 39Hours |
|---|---|

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| | |
|---|---|
| **Textbooks** | |
| **1.** | Fuzzy Sets and Fuzzy Logic: Theory and Applications, George J. Klir and Bo Yuan, 1996, Prentice Hall |
| **2.** | Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications, S. Rajasekaran and G. A. Vijayalakshmi Pai, 2017, Prentice Hall of India |
| **3.** | Elements Network of Artificial Neural, K. Mehrotra , 2009, Penram International Publishing Pvt Ltd; Second edition MIT, Cognet |
| **4.** | Neural Networks & Deep learning, Charu Aggarwal , 2018, Springer International Publishing |
| **Reference Books** | |
| **1.** | Fuzzy Logic with Engineering Applications, Timothy J. Ross, 2011, McGrawHill, New York |
| **2.** | Principles of Soft Computing, S. N. Sivanandam, S. N. Deepa, 2011, Wiley India Pvt Ltd |
| **3.** | "NeuralNetworksandDeepLearning",2015http://neuralnetworksanddeeplearning.com, MichaelNielsen, Determination Press |
| **4.** | Deep learning, Bengio,Yoshua, IanJ. Goodfellow, and Aaron Courville, 2015, An MIT Press book inpreparation |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | http://link.springer.com/openurl?genre=book&isbn=978-3-642-21331-1 |
| **2** | https://nptel.ac.in/courses/106105173 |
| **3** | https://onlinecourses.nptel.ac.in/noc22_cs54/preview |
| **4** | https://archive.nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs23/ |
| **5** | https://archive.nptel.ac.in/courses/106/105/106105173/ |

## VI Semester
## 22ET644– PE III : Power Electronics

**Course Outcomes:**

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

1. Design circuits using power semiconductor devices.
2. Analyze AC/DC , DC/DC and DC/AC and Cyclo-converters.
3. Design of Gate Drive and snubber circuits for SCR
4. Elaborate AC ,DC drives and SMPS

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| **Unit:1** | **Power semiconductor devices (part A)** | **6 Hours** |
| Power Semiconductor Diodes, classification, reverse recovery Characteristics, series and shunt connection of power diodes, Power Transistors, Switching characteristics of power transistor, Base drive control. **Contemporary Issues related to Topic** | | |
| **Unit:2** | **Power semiconductor devices(part B)** | **6 Hours** |
| Power MOSFETs, IGBT, Silicon controlled rectifier (SCR), dynamic Turn ON and Turn OFF characteristics of SCR, Firing circuit,Diac, Triac. **Contemporary Issues related to Topic** | | |
| **Unit:3** | **AC –DC Converter** | **7 Hours** |
| Commutation methods of SCR, Single phase half wave and full wave Controlled Rectifier with resistive and inductive load **Contemporary Issues related to Topic** | | |
| **Unit:4** | | **6 Hours** |
| DC-DC Converters (Chopper**)** Step up, step down Choppers, design of choppers AC Voltage Controllers. Principle of ON-OFF control, Phase control, single phase cyclo-converter **Contemporary Issues related to Topic** | | |
| **Unit:5** | **DC –AC Converter** | **7Hours** |
| Inverters—Series resonant inverters, Modified series inverter, parallel inverter, single phase bride inverter, current source inverter, Three phase bridge Inverter: 120 degree and 180 degree mode, design of inverter. Applications **Contemporary Issues related to Topic** | | |
| **Unit :6** | | **7 Hours** |
| Solar converter, buck converter, boost converter, Cuk converter, Design of Gate Drive circuits for SCR, SCR protection circuits, design of snubber circuit, Introduction to AC and DC drives. SMPS **Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | Power Electronics:Circuits,Devices and Applications, Fourth Edition by Muhammad H. Rashid, Academic press |
| **2** | Power Electronics, Second Edition 2008 by M. D. Singh,K. B. Khanchandani, TATA McGraw-Hill |
| **3** | Industrial and power electronics, Third Edition 2007 by Deodatta Y. Shinare, Electrotech Publication |
| **Reference Books** | |
| **1** | Power Electronics, Third Edition 2012 by Ned Mohan, John Wiley & sons |
| **2** | Fundamentals of power electronics, Third Edition 2020 by Erickson, Robert W., Maksimovic , Dragan |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electrical%20Engineering/Power%20Electronics/Muhammad%20H.%20Rashid-Power%20electronics%20_%20devices,%20circuits,%20and%20applications-Pearson%20(2014).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electrical%20Engineering/Power%20Electronics/Power%20Electronics%20by%20Ps%20bimbhra.pdf |
| **3** | http://link.springer.com/openurl?genre=book&isbn=978-1-4471-5537-9 |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/108/102/108102145/ |
| **2** | https://www.digimat.in/nptel/courses/video/108101126/L01.html |
| **3** | https://www.youtube.com/watch?v=fOZ8bUrFJGk |
| **4** | https://www.youtube.com/watch?v=P0MK7sWfs9k |

## VI Semester

## 22ET645– PE III : Information Theory and Coding

**Course Outcomes:**

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

1. Analyze, measure of information, Entropy, Rate of information.
2. Illustrate information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms.
3. Elaborate the continuous and discrete communication channels using input, output and joint probabilities
4. Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes

| **Unit:1** | **Information theory** | **7 Hours** |
|---|---|---|

Concept of amount of information, information units Entropy: marginal, conditional, joint and relative entropies, relation among entropies Mutual information, information rate,

**Contemporary Issues related to Topic**

| **Unit:2** | **Source Coding** | **6 Hours** |
|---|---|---|

Encoding of the Source Output, Shannon's Encoding Algorithm, Shannon Fano Encoding Algorithm Source coding theorem, Prefix Codes, Kraft McMillan Inequality property KMI, Huffman codes .

**Contemporary Issues related to Topic**

| **Unit:3** | **Information Channels** | **7Hours** |
|---|---|---|

Communication Channels, Discrete Communication channels Channel Matrix, Joint probabilty Matrix, Binary Symmetric Channel, System Entropies., Channel Capacity, Channel Capacity of Binary Symmetric Channel, Binary Erasure Channel.

**Contemporary Issues related to Topic**

| **Unit:4** | **Error Control Coding** | **6 Hours** |
|---|---|---|

Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error detection & Correction capabilities of Linear Block Codes, Single error correction Hamming code. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

**Contemporary Issues related to Topic**

| **Unit:5** | **Convolution Codes** | **7 Hours** |
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Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm

**Contemporary Issues related to Topic**

| **Unit :6** | **Interleaving techniques** | **6 Hours** |
|---|---|---|

Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system - CIRC encoding and decoding, interpolation and muting. ARQ – Types of ARQ, Performance of ARQ, Probability of error and throughput

**Contemporary Issues related to Topic**

| **Total Lecture Hours** | **39 Hours** |
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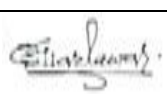
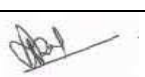
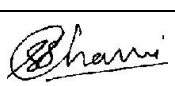
|  |  |  | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

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| **Textbooks** | |
| **1** | Digital and Analog Communication Systems,, 5th edition Date:2006, K. Sam Shanmugam, Wiley India Pvt. Ltd |
| **2** | Digital Communication, 3rd edition August 2007, Simon Haykin, JOHN WILEY & SONS |
| **Reference Books** | |
| **1** | Information Theory, Coding and Cryptography Ranjan Bose, McGraw Hill Education , II edition, 25 April 2008 |
| **2** | Digital Conummications- Fundamentals and Applications, Bernard Sklar, Second Edition, Pearson Education, 2016, |
| **3** | Information Theory and Coding, HariBhat, Ganesh Rao,. Cengage India Private Limited, First Edition, 1 September 2017 |
| **4** | Error Correction Coding, Todd K Moon,Wiley Std. Edition 2, 2006 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL Course on Information Theory ,Coding and Cryptography ,IIT Delhi by Prof.Ranjan Bose, https://nptel.ac.in/courses/108102117 |

# VI Semester
# 22ET646– PE III : VLSI Testing and Testability

**Course Outcomes:**

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

1. Explain VLSI Design Verification and Testing Issues
2. Generate test pattern for Faults in a system and design system for Testability
3. Apply different faults and carry out fault simulation in Digital Circuits
4. Elaborate the importance of Testing and its types in VLSI Circuits.

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| **Unit:1** | Overview of Testing | **7 Hours** |
| Design Process, Verification, Faults & Their Detection, Test Pattern Generation, Fault Coverage, Types Of Tests, Test Application, Testing Economics. Defects, Failures, and Faults: Physical Defects, Failures Modes, Faults, Fault Equivalence and Dominance, Fault Collapsing | | |
| **Unit:2** | Design Representation | **6 Hours** |
| Graphical representation, Graphs, Binary Decision diagrams, Netlists, VLSI Design Flow: CAD tools, Design Methodologies, Semicustom Design | | |
| **Unit:3** | Simulation | **7 Hours** |
| Logic Simulation, Approaches to Simulation, Fault Simulation & Their Results. Automatic Test Pattern Generation: D-Algorithm, Critical Path Extensions to D-Algorithm PODEM, FAN | | |
| **Unit:4** | Ad Hoc Techniques | **6 Hours** |
| Ad Hoc Techniques, Scan–Path Design, Test pattern generation, Test Pattern Application, Scan architectures, multiple scan chains, Partial Scan Testing | | |
| **UNIT:5** | Boundary-Scan Testing | **7Hours** |
| Boundary Scans Architecture, Test Access Port, Registers, Tap Controller, Modes of Operation. Built In Self Test: Pseudorandom Test Pattern Generation, Response Compaction, BIST Architectures | | |
| **Unit :6** | Memory Testing: | **6 Hours** |
| Types of Memory Testing, Functional Testing Schemes, Testing FPGAs and Microprocessors: Testability Of FPGAs, Testing RAM- Based FPGAs, Testing Microprocessors, Synthesis For Testability. | | |
| **Total Lecture Hours** | | **39 Hours** |

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| **Textbooks** | |
| **1** | "Principles of Testing Electronic Systems", 2nd edition Samiha Mourad, Yervant Zorian |
| **2** | . "Essentials of Electronic Testing for Digital, Memory, and Mixed-Signal VLSI Circuits",Michael L. Bushnell and Vishwani D. Agrawal, B.S.Publications, 2000 |
| **3** | "Digital Systems Testing and Testable Design" ,MironAbramovici, Melvin Breuer and Arthur Friedman, IEEE press, |
| Reference Books | |
| **1** | "A Guide to VHDL" by Stanley Mazor,2nd Edition, Kluwer Academic Press, 2007 |
| **2** | "HDL Chip Design" by Douglas Smith, 3rd Edition, Doone Publications, 2008 6. "Rapid Prototyping of Digital Systems", by J. O. Hamblen and M. Furman, Kluwer Academic Publishers.2001 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/ |
| **2** | http://103.152.199.179/YCCE/NPTEL%20VIDEOS%20PHASE%20I%20%20-%20PART3/Electronics%20and%20Communication%20Engineering/VLSI%20Design/ |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | |

## VI Semester
## 22ET661 – OE III : Principles of Communication

| **Course Outcomes:** | | |
|---|---|---|
| **Upon successful completion of the course the students will be able to**<br>1. Describe analog communication systems and various modulation scheme.<br>2. Explain digital communication systems and various modulation scheme.<br>3. Analyse error correcting codes, including block codes.<br>4. Use the different application of satellite communication. | | |
| **Unit:1** | Analog Communication | **7 Hours** |
| Introduction to Communication Systems; Noise, Types of noise, sources of noise; Need for modulation, AM-Time domain representation, Frequency spectrum , power relations, DSB/SC, SSB.<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | Angle Modulation | **6 Hours** |
| Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, FM Transmitter block diagram.<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Digital Communication** | **7 Hours** |
| Introduction Digital Communication System; Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM; Waveform coding Techniques: Pulse code Modulation (PCM),Delta Modulation, Adaptive Delta modulation<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | Digital Modulation | **6 Hours** |
| Data formats ;Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Phase Shift Keying (PSK) – BPSK – QPSK– Quadrature Amplitude Modulation (QAM)<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | Information Theory | **6 Hours** |
| Entropy, Properties of entropy; source coding: Huffman coding**;** error control codes: Linear Block Code<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Satellite Communication** | **7 Hours** |
| Communication Satellite: Orbit and Description: A Brief history of satellite Communication, satellite Frequency Bands, Satellite Systems, Applications, frequency used link establishment Earth Station Technology: Transmitters, Receivers.<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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|---|---|
| **Textbooks** | |
| **1** | B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998. |
| **2** | J.Das "Principles of Digital Communication" New Age International, 1986 |
| **Reference Books** | |
| **1** | Kennedy and Davis "Electronic Communication Systems" Tata McGraw hill, 4th Edition, 1993. |
| **2** | Sklar "Digital Communication Fundamentals and Applications" Pearson Education, 2001. |
| **3** | Bary le, Memuschmidt, Digital Communication, Kluwer Publication, 2004. |
| **4** | B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998.<br>Taub & Schiling "Principles of Communication Systems" Tata McGraw Hill 2007 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL Course on Principles of Communication Systems By Prof. Aditya K. Jagannatham IIT Kanpur, https:// nptel.ac.in/courses/108/104/108104091/ |

## VI Semester
## 22ET662 – OE III: Industrial Automation

**Course Outcomes:**

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

1. Analyse industrial need of automation and systems application.
2. Illustrate industrial automation components and hardware.
3. Impart the role of PLC in industry automation
4. Expose to various control techniques employed in process automation
5. Elaborate various applications of networking and communication systems.

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| **Unit:1** | **Introduction to Industrial Automation** | **7 Hours** |

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and Supervisory Control and Data Acquisition (SCADA).

**Contemporary Issues related to Topic**

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| **Unit:2** | **Automation Components** | **6 Hours** |

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves. Introduction of DC and AC servo drives for motion control.

**Contemporary Issues related to Topic**

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| **Unit:3** | **Automation in Process Industries** | **7Hours** |

Introduction to computer based industrial automation. Programming languages of PLC, Basic instruction sets. PLC programming, Ladder diagram, Sequential flow chart, PLC selection, PLC Installation.

**Contemporary Issues related to Topic**

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| **Unit:4** | **Distributed Control System** | **6 Hours** |

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.

**Contemporary Issues related to Topic**

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| **Unit:5** | **SCADA/ HMI System Development** | **7 Hours** |

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.

**Contemporary Issues related to Topic**

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| **Unit :6** | **Industrial Networking** | **6 Hours** |

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.

**Contemporary Issues related to Topic**

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| **Total Lecture Hours** | **39 Hours** |

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| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

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|---|---|
| **Textbooks** | |
| **1** | Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies |
| **2** | Programmable logic controller, Dunning, Delmar |
| **Reference Books** | |
| **1** | Process Control Instrumentation Technology By. C.D. Johnson, PHI |
| **2** | Digital Communication, 1st edition, Shanmugham, CBS Publisher |
| **3** | Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication |
| **4** | Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | NPTEL, online courses and certification, Learn for free |
| **2** | https://swayam.gov.in/ |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | NPTEL, online courses and certification, Learn for free |

## VI Semester

## 22ET663 – OEIII: Medical Electronics

| **Course Outcomes:** | | |
|---|---|---|
| **Upon successful completion of the course the students will be able to**<br>1. Describe various parameters of human anatomy and physiology.<br>2.Gain the knowledge of biopotential signals<br>3.Explain the functioning of different Measuring and Recording instruments<br>4.Elaborate the working of modern Imaging and Therapeutic Equipment | | |
| **Unit:1** | **Fundamentals of Medical Instrumentation** | **6 Hours** |
| Anatomy and physiology, biometrics, components of the man instrumentation, Physiological System of body, Sources of bioelectric potentials(Resting and action potential, Propagation of action potential and Bioelectric potential). | | |
| **Unit:2** | **Physiological Transducer and Electrodes** | **7 Hours** |
| Classification of transducers, Performance characteristics of transducers, Displacement, Position and Motion transducers, Pressure transducers, Photoelectric transducers, transducers for body Temperature measurement Optical Fibre sensors, biosensors and smart sensors. Electrodes for ECG, EEG, EMG, and Microelectrodes. | | |
| **Unit:3** | **Biochemical and Non Electrical Parameter Measurement** | **7Hours** |
| Blood pressure measurement, Blood flow meters and Cardiac output measurement , Plethysmography Heart sound, Measurement in Temperature ,Pulse and Respiratory system, Blood Cell Counters. | | |
| **Unit:4** | **Biomedical Recorders** | **6 Hours** |
| Nature of biomedical signal, Example of biomedical signals with the functioning of the organs. EMG, ECG, EEG,PCG lead system and recording methods ,typical waveform and signals characteristics, other biomedical recorders. | | |
| **Unit:5** | **Medical Imaging System** | **6 Hours** |
| X-ray imaging - Properties and production of X-rays, X-ray machine, applications of X-rays in medicine. Computed Tomography Principle, image reconstruction, scanning system and applications. Ultrasonic imaging systems: Basic pulse echo system, propagation of ultrasonic through tissues and reflections, display types, A-Scan, B-Scan, M-Scan, applications, real-time ultrasonic imaging systems and probes. | | |
| **Unit :6** | **Therapeutic Equipment** | **7 Hours** |
| Cardiac pacemaker: Need of cardiac pacemaker, external pacemaker and implantable pacemaker. Cardiac Defibrillators: Need of Defibrillator, DC Defibrillator and Implantable Defibrillator.<br>Ventilators: Types of ventilators, Ventilator Terms ,classification of ventilators, Modern and high Frequency Ventilators . | | |
| **Total Lecture Hours** | | **39 Hours** |

| | |
|---|---|
| **Textbooks** | |
| **1** | Leslie Cromwell, ―Biomedical Instrumentation and Measurement‖, Prentice Hall of India, New Delhi, 2007. |
| **2** | Joseph J.Carr and John M.Brown, ―Introduction to Biomedical Equipment Technology‖, John Wiley and Sons, New York, 2004. |
| **Reference Books** | |
| **1** | Khandpur, R.S., ―Handbook of Biomedical Instrumentation‖, TATA Mc Graw-Hill, second edition New Delhi,2003 |
| **2** | John G.Webster, ―Medical Instrumentation Application and Design‖, 3rd Edition, Wiley India Edition, 2007 |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | https://www.pdfdrive.com/biomedical-instrumentation-and-measurements-d186986101.html |
| **2** | https://www.academia.edu/39250912/Handbook_of_Second_Edition_Biomedical_Instrumentation |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | |

## VI Semester

## 22ET664 – OEIII: Fundamentals of Image Processing

**Course Outcomes:**

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

1. Examine the concepts of image enhancement, restoration, segmentation, representation and description
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description

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| **Unit:1** | **Introduction** | **7 Hours** |

Fundamental Steps in image processing, Component of Image processing system, Image formation Model, Sampling and quantization, Image Resolution, Interpolation Techniques, Concept of gray levels, Relationship between pixels.

**Contemporary Issues related to Topic**

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| **Unit:2** | **Intensity Transformations** | **6 Hours** |

Basic intensity transformation techniques: Image negative, log transformation, power law transformation, piecewise
linear transformation, Histogram Equalization.

**Contemporary Issues related to Topic**

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| **Unit:3** | **Spatial Domain Filtering** | **7 Hours** |

Mechanics of Spatial filtering, Smoothing spatial filters: Linear and Order statistic filters. Sharpening filters: Foundation, Laplacian and Gradient.

**Contemporary Issues related to Topic**

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| **Unit:4** | **Image Restoration** | **6 Hours** |

Image Restoration: Image degradation/restoration process, noise model, restoration in presence of noise, periodic noise reduction.

**Contemporary Issues related to Topic**

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| **Unit:5** | **Image Segmentation** | **7 Hours** |

Detection of discontinuities: Point, Line and Edge, Thresholding, Region based segmentation: Region Growing, Split and Merge.

**Contemporary Issues related to Topic**

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| **Unit :6** | **Representation and Description** | **6 Hours** |

Representation, Simple Descriptor, Shape Number, Fourier Descriptor, Statistical Moments; Region Feature descriptor: Basic descriptor, Topological Descriptor, Texture Descriptor

**Contemporary Issues related to Topic**

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| **Total Lecture Hours** | **39 Hours** |

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|---|---|---|---|---|---|
| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Text books** | |
| **1** | R.C. Gonzalez & R.E. Woods, Digital Image Processing, 3nd/ 4th edition, PHI publication, 2009. |
| **2** | William K. Pratt, Digital Image Processing, 4th edition, A John Wiley & Sons, Inc., Publication, 2001. |
| **Reference Books** | |
| **1** | A. K. Jain, Fundamentals of Digital Image Processing, PHI publication. |
| **2** | S. Jayaraman, S. sakkirajan,T Veerakumar, Digital Image Processing, McGraw-Hill Publication. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/yccelibrary.html |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | http://nptel.iitm.ac.in/video.php?subjectId=117105079, |
| **2** | www.imageprocessingplace.com |

## VI Semester

## 22ET681 – OE IV: Fundamentals of Computer Networks

**Course Outcomes:**

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

1. Compare data transmission protocols and understand the applications of communication network
2. Apply the knowledge of LAN structure to design data communication system.
3. Detect Data transmission errors in communication networks.
4. Compare different data security protocols

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| **Unit:1** | **Computer Network and Internet** | **7 Hours** |
| Internet, the network edge, ISPs, Protocols, standards, standards of organizations<br><br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Link Layer and Local Area Networks** | **6 Hours** |
| Error detection and correction techniques, multiple access protocols, link layer addressing<br><br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **Network Layer** | **7 Hours** |
| Network layer design issues, IP packets, IP addressing, virtual circuit and datagram networks, TCP and UDP<br><br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Transport Layer** | **6 Hours** |
| Transport layer design issues, transport service primitives, internet transport protocol TCP/IP architecture, TCP/IP protocol<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **Security in Communication Networks** | **7 Hours** |
| Network Security, cryptography, public key and private key cryptography<br><br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Application Layer** | **6 Hours** |
| HTTP, FTP, Email, DNS, WWW, POP3, IMAP<br>**Contemporary Issues related to Topic** | | |
| **Total Lecture Hours** | | **39 Hours** |

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| **Textbooks** | |
| 1 | Data Communication and Networking Behrouz Forouzan Fifth Edition McGraw Hill |
| 2 | Computer Networking A top down Approach Featuring and Internet James F. Kurose Third Edition Pearson |
| **Reference Books** | |
| 1 | Computer Networks Andrew Tanenbaum Fourth Edition Prentice Hall PTR |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| 1 | |
| **MOOCs Links and additional reading, learning, video material** | |
| 1 | NPTEL course link Computer Networks and Internet Protocol Prof Soumya Kanti Ghosh & Prof Sandip |

## VI Semester

## 22ET682 – OE IV: Soft Computing

**Course Outcomes:**

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

1. Identify and describe genetic operators and genetic algorithms in problem solving
2. Apply Neural Network algorithm for pattern classification
3. Apply fuzzy logic and arithmetic to handle uncertainty and solve engineering problems
4. Understand fuzzy rule base and fuzzy controller

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| **Unit:1** | **Genetic Algorithm** | **7 Hours** |

Basic terminologies used in Genetic Algorithm, Simple GA, General Genetic Algorithm, Encoding, Selection, Crossover, Mutation, Stopping Condition for GA, Constraint in GA

**Contemporary Issues related to Topic**

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| **Unit:2** | **Neural Networks** | **6 Hours** |

Biological Neurons and Their Artificial Models, Models of Artificial Neural Networks, Learning Methods, Activation Functions, McCulloch-Pitts Neuron Model, Neural Network Learning Rules, Application of NN

**Contemporary Issues related to Topic**

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| **Unit:3** | **Supervised Learning** | **7 Hours** |

Single Layer Perceptron, Back propagation algorithm, Associative Memory

**Contemporary Issues related to Topic**

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| **Unit:4** | **Unsupervised learning** | **6 Hours** |

Hamming and Max net, Competitive Learning, Self-organizing feature maps, ART Networks, RBF

**Contemporary Issues related to Topic**

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| **Unit:5** | **Fuzzy Sets and Operations** | **7 Hours** |

Concepts of Fuzzy sets, Extension Principle, Operation on fuzzy sets, Fuzzy numbers, Arithmetic operations, Lattice, Fuzzy equations

**Contemporary Issues related to Topic**

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| **Unit :6** | **Fuzzy logic and Systems** | **6 Hours** |

Fuzzy relations, Fuzzy Logic, Approximate Reasoning Fuzzy controllers, Defuzzification Methods, Fuzzy Inference Techniques Applications, New topics to be announced time to time.

**Contemporary Issues related to Topic**

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| **Total Lecture Hours** | **39 Hours** |

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| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | Soft Computing, 2011, Shivnandam, Wiley |
| **2** | Elements of Artificial Neural Network, 2009, K. Mehrotra, Penram |
| **3** | Fuzzy sets and Fuzzy logic, 2015, George Klir, Bo Yuan, Pearson |
| **Reference Books** | |
| **1** | Neural Networks, a comprehensive foundation, 1997, Simon Haykins, Person |
| **2** | Fuzzy Logic & Applications, 2011, T. Ross, Wiely |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://www.myreaders.info/html/soft_computing.html |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://nptel.ac.in/courses/106/105/106105173/ |

## VI Semester

## 22ET683 – OE IV: Microcontrollers & Embedded systems

**Course Outcomes:**

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

1) Elaborate 8051 microcontroller architecture.
2) Develop assembly and embedded C language program.
3) Interface 8051 microcontroller with different peripherals
4) Interface Arduino processor with different peripherals

| **Unit:1** | **7 Hours** |
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Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview **Contemporary Issues related to Topic**

| **Unit:2** | **6 Hours** |
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Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs. **Contemporary Issues related to Topic**

| **Unit:3** | **7Hours** |
|---|---|

I/O Interfacing such as LED, switches, 7segment display, keyboard matrix programming, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access **Contemporary Issues related to Topic**

| **Unit:4** | **6 Hours** |
|---|---|

Timer programming in assembly and C: Various modes of operation, SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, 8051 connection to RS 232. Serial data transfer programs. **Contemporary Issues related to Topic**

| **Unit:5** | **7 Hours** |
|---|---|

Interfacing of LCD, ADC, DAC, stepper motor and DC motor with 8051 microcontroller **.**
**Contemporary Issues related to Topic**

| **Unit :6** | **6 Hours** |
|---|---|

Block diagram of Arduino, features of Arduino Architecture, Arduino pin description: digital pins, analog pins, Power pins and other pins, Interfacing of LED, 7-Segment display, LCD, Sensors, DC motor, switch and Serial communication.

**Contemporary Issues related to Topic**

| | **Total Lecture Hours** | **39 Hours** |
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| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

| | |
|---|---|
| **Textbooks** | |
| **1** | The 8051 Microcontroller and Embedded systems using assembly & C, 2nd edition, Muhammad Ali Mazidi, Pearson Education Asia LPE |
| **2** | The 8051 Microcontroller, 3rd edition, CENGAGE Learning |
| **3** | Arduino Development Cookbook, Cornel Amariei, PACKT Publishing |
| **Reference Books** | |
| **1** | The 8051 Microcontroller, 3rd Edition, 2007,Kenneth Ayala,, Cengage |
| **2** | 8051 Microcontroller-Internals ,Instructions ,Programming & Interfacing, 2002,Ghoshal, Pearson Education India |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/108/105/108105102/ |

## VI Semester

## 22ET684 – OE II: Fundamentals of Internet of Things

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| **Course Outcomes:** | | |
| **Upon successful completion of the course the students will be able to**<br>1. Explore the physical and Logical design of IoT.<br>2. Explore the M2M and NETCONF.<br>3. Explore python programming.<br>4. Apply basic skills of IoT to solve real life problems.<br>5. Illustrate IoT Security | | |
| **Unit:1** | **Introduction & Concepts:** | **5 Hours** |
| UNIT-1: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels<br>**Contemporary Issues related to Topic** | | |
| **Unit:2** | **Sensing & Actuation** | **6 Hours** |
| Introduction to sensors & transducers, Introduction to electrodes & biosensors, Static and dynamic characteristics of sensors, Different types of sensors, Selection criteria's for sensors / transducers, Commercial IoT sensors / transducers, Signal conditioning modules of IoT system.<br>**Contemporary Issues related to Topic** | | |
| **Unit:3** | **M2M & System Management with NETCONF-YANG** | **7 Hours** |
| M2M, Difference between IOT and M2M, SDN and NFV for IOT, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF<br>**Contemporary Issues related to Topic** | | |
| **Unit:4** | **Developing Internet of Things & Logical Design using Python** | **7 Hours** |
| Introduction, IOT Design Methodology, Python Data Types & Data Structures, Control Flow, Functions , File Handling, Date/ Time Operations, IoT Device-Raspberry Pi, Programming Raspberry pi with Python<br>**Contemporary Issues related to Topic** | | |
| **Unit:5** | **IoT Security** | **7 Hours** |
| Effect of security threats on user, authentication using OTP validation, Security Requirements for the Internet of Secure Things, Secure Solutions, Secure Framework of the IoT Related to Perceptual Layer, Challenges in IoT Security<br>**Contemporary Issues related to Topic** | | |
| **Unit :6** | **Domain Specific IOTs** | **7 Hours** |
| Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.<br>**Contemporary Issues related to Topic** | | |
| **Total LectureHours** | | **39 Hours** |

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| | | | July 2023 | 1.00 | Applicable for AY 2022-23 Onwards |
| Chairperson | Dean (Acad. Matters) | Dean OBE | Date of Release | Version | |

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|---|---|
| **Textbooks** | |
| **1** | Arshdeep Bahga and Vijay Madisetti , "Internet of Things, a hands on approach" , Universities Press (India)Pvt. Ltd. 2017, ISBN: 978-81-7371-954-7. |
| **Reference Books** | |
| **1** | Internet of Things : Technologies, Applications, Challenges and Solution B.K.Tripathy & J.Anuradha by CRC press publication |
| **2** | From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1 st Edition, Academic Press, 2014. |
| **YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]** | |
| **1** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/UG%20COURSES/IIOT/IIOT%20(%20G%20Series).pdf |
| **2** | http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/30.2019_Book_InternetOfThingsFromHypeToReal.pdf |
| **MOOCs Links and additional reading, learning, video material** | |
| **1** | https://archive.nptel.ac.in/courses/106/105/106105166/ |
| **2** | https://onlinecourses.nptel.ac.in/noc21_ee85/preview |

# VI Semester
# MLC126 – YCCE Communication Aptitude Preparation (YCAP6)