# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

### 3rd SEMESTER

| Sl. No. | Type | Paper Code | Paper Name | L | T | P | Total | Credit |
|---|---|---|---|---|---|---|---|---|
| 1. | CC | PCCEC301 | Electronic Devices | 3 | 0 | 0 | 3 | 3 |
| 2. | CC | PCCEC302 | Digital System Design | 3 | 0 | 0 | 3 | 3 |
| 3. | CC | PCCEC303 | Signals and Systems | 3 | 0 | 0 | 3 | 3 |
| 4. | GE | PCCEC304 | Network Theory | 3 | 0 | 0 | 3 | 3 |
| 5. | BSC | BSC301 | Mathematics III | 3 | 0 | 0 | 3 | 3 |
| 6. | MC | MCEC301 | Constitution of India | 1 | 0 | 0 | 1 | 0 |
| 7. | GSC | HSMC302 | ESP III | 2 | 0 | 0 | 2 | 2 |
| 8. | CC | PCCEC391 | Electronic Devices Laboratory | 0 | 0 | 2 | 2 | 1 |
| 9. | CC | PCCEC392 | Digital System Design Laboratory | 0 | 0 | 2 | 2 | 1 |
| 10. | CC | PCCEC393 | Signals and Systems Laboratory | 0 | 0 | 2 | 2 | 1 |
| 11. | GE | OECEC381 | Data Structure & Algorithm | 1 | 0 | 2 | 3 | 2 |
| 12. | GSC | HSMC382 | SDP III | 0 | 0 | 2 | 2 | 1 |
| 13. | ECP | ECP381 | Mini Project - I | - | - | - | 1 | 1 |
| 14. | Mandatory Course | MAR(ECE)381 | Mandatory Additional Requirement (MAR) | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | **Total Credit Points =** | **24** |
| | | | | | | | **Cumulative Credit Points Total =** | **-** |

# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

### 4th SEMESTER

| Sl. No. | Type | Paper Code | Paper Name | L | T | P | Total | Credit |
|---|---|---|---|---|---|---|---|---|
| 1. | CC | PCCEC401 | Analog & Digital Communication | 3 | 0 | 0 | 3 | 3 |
| 2. | CC | PCCEC402 | Analog Electronic Circuits | 3 | 0 | 0 | 3 | 3 |
| 3. | CC | PCCEC403 | Microcontrollers | 3 | 0 | 0 | 3 | 3 |
| 4. | MC | MCEC401 | Environmental Science | 1 | 0 | 0 | 1 | 0 |
| 5. | MC | MC402 | Mathematics & Statistics - IV | 3 | 0 | 0 | 3 | 0 |
| 6. | GSC | HSMC402 | ESP IV | 2 | 0 | 0 | 2 | 2 |
| 7. | CC | PCCEC491 | Analog & Digital Communication Laboratory | 0 | 0 | 2 | 2 | 1 |
| 8. | CC | PCCEC492 | Analog Electronic CircuitsLaboratory | 0 | 0 | 2 | 2 | 1 |
| 9. | CC | PCCEC493 | Microcontrollers Laboratory | 0 | 0 | 2 | 2 | 1 |
| 10. | GE | OECEC481 | Object Oriented Programming | 1 | 0 | 2 | 3 | 2 |
| 11. | GSC | HSMC482 | SDP IV | 0 | 0 | 2 | 2 | 1 |
| 12. | ECP | ECP481 | Mini Project - II | - | - | - | 1 | 1 |
| 13. | Mandatory Course | MAR(ECE)481 | Mandatory Additional Requirement (MAR) | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | **Total Credit Points =** | **18** |
| | | | | | | | **Cumulative Credit Points Total =** | |

# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

### 5th SEMESTER

| Sl. No. | Type | Paper Code | Paper Name | L | T | P | Total | Credit |
|---|---|---|---|---|---|---|---|---|
| 1. | CC | PCCEC501 | Electromagnetic Waves | 3 | 0 | 0 | 3 | 3 |
| 2. | CC | PCCEC502 | Digital Signal Processing | 3 | 0 | 0 | 3 | 3 |
| 3. | CC | PCCEC503 | Computer Architecture | 3 | 0 | 0 | 3 | 3 |
| 4. | ECEL | PECEC504 | **Program Elective-1**<br>A. Information Theory & Coding<br>B. CMOS Design | 3 | 0 | 0 | 3 | 3 |
| 5. | OEC | OECEC505 | **Open Elective-1**<br>A. Data Base Management System<br>B. Design & Analysis of Algorithm | 3 | 0 | 0 | 3 | 3 |
| 6. | GSC | HSMC(ECE)502 | ESP(ECE)-V | 2 | 0 | 0 | 2 | 0.5 |
| 7. | GSC | HSMC503 | Economics for Engineers | 2 | 0 | 0 | 2 | 1 |
| 8. | CC | PCCEC591 | Electromagnetic Waves Laboratory | 0 | 0 | 2 | 2 | 1 |
| 9. | CC | PCCEC592 | Digital Signal Processing Laboratory | 0 | 0 | 2 | 2 | 1 |
| 10. | GSC | HSMC582 | SDP V | 0 | 0 | 2 | 2 | 0.5 |
| 11. | ECP | ECP581 | Mini Project - III | - | - | - | 1 | 1 |
| 12. | Mandatory Course | MAR(ECE)581 | Mandatory Additional Requirement (MAR) | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | **Total Credit Points =** | **20** |
| | | | | | | | **Cumulative Credit Points Total =** | |

**Discipline Specific Elective / Program Elective-1 Generic Elective / Open Elective-1** **A.** Information Theory & Coding **A.** Data Base Management System **B.** CMOS Design **B.** Design & Analysis of Algorithm

# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

### 6th SEMESTER

| Sl. No. | Type | Paper Code | Paper Name | L | T | P | Total | Credit |
|---|---|---|---|---|---|---|---|---|
| 1. | CC | PCCEC601 | Control System | 3 | 0 | 0 | 3 | 3 |
| 2. | CC | PCCEC602 | Computer Network | 3 | 0 | 0 | 3 | 3 |
| 3. | ECEL | ECELEC603 | Program Elective-2 | 3 | 0 | 0 | 3 | 3 |
| 4. | OEC | OECEC604 | Open Elective-2 | 3 | 0 | 0 | 3 | 3 |
| 5. | GSC | HSMC(ECE)602 | ESP(ECE)-VI | 2 | 0 | 0 | 2 | 0.5 |
| 6. | GSC | HSMCEC603 | Principles of Management | 2 | 0 | 0 | 2 | 2 |
| 7. | CC | PCCEC691 | Control System Laboratory | 0 | 0 | 2 | 2 | 1 |
| 8. | CC | PCCEC692 | Computer NetworkLaboratory | 0 | 0 | 2 | 2 | 1 |
| 9. | CC | PCCEC694 | Electronic Measurement Laboratory | 0 | 0 | 2 | 2 | 1 |
| 10. | GSC | HSMC682 | SDP VI | 0 | 0 | 2 | 2 | 0.5 |
| 11. | ECP | ECP681 | Mini Project – III / Electronic Design Workshop | - | - | - | 2 | 2 |
| 12. | Mandatory Course | MAR(ECE) 681 | Mandatory Additional Requirement (MAR) | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | **Total Credit Points =** | **20** |
| | | | | | | | **Cumulative Credit Points Total =** | |

**Discipline Specific Elective / Program Elective-2 Generic Elective / Open Elective-2** **A.** Machine Learning

**A.** Power Electronics **B.** Operating Systems **B.** Nano electronics

# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

### 7th SEMESTER

| Sl. No. | Type | Paper Code | Paper Name | L | T | P | Total | Credit |
|---|---|---|---|---|---|---|---|---|
| 1. | ECEL | ECELEC701 | Program Elective-3 | 3 | 0 | 0 | 3 | 3 |
| 2. | ECEL | ECELEC702 | Program Elective-4 | 3 | 0 | 0 | 3 | 3 |
| 3. | ECEL | ECELEC703 | Program Elective-5 | 3 | 0 | 0 | 3 | 3 |
| 4. | OEC | OECEC704 | Open Elective-3 | 3 | 0 | 0 | 3 | 3 |
| 5. | GSC | HSMC(ECE)702 | ESP(ECE)-VII | 2 | 0 | 0 | 2 | 0.5 |
| 6. | GSC | HSMC702 | Organizational Behaviour | 2 | 0 | 0 | 2 | 2 |
| 8. | CC | PCCEC791A | Microwave Laboratory | 0 | 0 | 2 | 2 | 1 |
| | | PCCEC791B | Embedded System | 0 | 0 | 2 | 2 | |
| 9 | GSC | HSMC782 | SDP VII | 0 | 0 | 2 | 2 | 0.5 |
| 10. | ECP | ECP781 | Project Work - I | - | - | - | 5 | 5 |
| 11. | Mandatory Course | MAR(ECE)781 | Mandatory Additional Requirement (MAR) | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | **Total Credit Points =** | 21 |
| | | | | | | | **Cumulative Credit Points Total =** | |

**Discipline Specific Elective / Program Elective-3 Program Elective-5**

**A.** Microwave Theory and Techniques **A.** Satellite Communication **B.** Embedded System **B.** Adaptive Signal Processing

**Discipline Specific Elective / Program Elective-4 Generic Elective / Open Elective-3** **A.** Mobile Communication and Networks

**A.** Internet of Things **B.** Mixed Signal Design **B.** Software Engineering

**C.** Cryptography & Network Security

# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

### 8th SEMESTER

| Sl. No. | Type | Paper Code | Paper Name | L | T | P | Total | Credit |
|---|---|---|---|---|---|---|---|---|
| 1. | ECEL | ECELEC801 | Program Elective-6 | 3 | 0 | 0 | 3 | 3 |
| 2. | ECEL | ECELEC802 | Program Elective-7 | 3 | 0 | 0 | 3 | 3 |
| 3. | OEC | OECEC803 | Open Elective-4 | 3 | 0 | 0 | 3 | 3 |
| 4. | OEC | OECEC804 | Open Elective-5 | 3 | 0 | 0 | 3 | 3 |
| 5. | GSC | HSMC802 | ESP(ECE) VIII | 2 | 0 | 0 | 2 | 0.5 |
| 6. | GSC | HSMC882 | SDP VIII | 0 | 0 | 2 | 2 | 0.5 |
| 7. | ECP | ECP881 | Project Work – II & Dissertation | - | - | - | 5 | 5 |
| 8. | CC | PCCEC891 | GRAND VIVA | - | - | - | - | 2 |
| 9. | Mandatory Course | MAR(ECE)881 | Mandatory Additional Requirement (MAR) | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | **Total Credit Points =** | **20** |
| | | | | | | | **Cumulative Credit Points Total =** | |

**Discipline Specific Elective / Program Elective-6 Generic Elective / Open Elective-4** **A.** Fibre Optic Communication **A.** Deep learning

**B.** Antenna and Propagation Theory **B.** Cloud Computing **Discipline Specific Elective / Program Elective-7 Generic Elective / Open Elective-5** **A.** Mobile Computing

**A.** Wireless Sensor Networks **B.** Optimization Technique **B.** Digital Image and Video Processing

# CUMULATIVE CREDIT POINTS

**A. B.Tech Course (Electronics & Communication Engineering)**

| SEMESTER | TOTAL CREDIT POINTS |
|---|---|
| 3. | 24 |
| 4. | 18 |
| 5. | 20 |
| 6. | 20 |
| 7. | 21 |
| 8. | 20 |
| Total | 123 |

**MOOCs 20 credits has to be earned to obtain B.Tech Honours Degree**

**IVC/IFC courses has to be done as per the instruction/guidance from the Placement Dept**

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: ELECTRONIC DEVICES**
**SUBJECTCODE: PCCEC301**

| | |
|---|---|
| **Subject Code:** PCCEC301 | **Category** : C C |
| **Subject Name**: Electronic Devices | **Semester** : 3rd |
| **L-T-P** : 3-0-0 (Total Contact Hrs.3) | **Credit:** 3 |
| **Pre-Requisites:** Basic Electronics, Basic Physics | |

## Course Objective:

1. 1. To understand the basics of different electronic devices being used by Electronics Engineers.
2. 2. To learn different Physical and mathematical concept within the operation of these electronic devices and apply this knowledge in various applications.
3. 3. To understand operations of different opto-electronic and microwave devices and to apply this knowledge in various applications.
4. 4. To learn the basics of Semiconductor physics.
5.

## Course Outcomes:

**CO1:** Student will be able to understand the fundamentals of electrical and electronic circuits and working of basic electrical instruments and electronic components.
**CO2:** Student will be able to explain the working principle and operations of basic diode, BJT, JFET, MOSFET, different optoelectronic devices, different microwave devices etc. which are normally used in different electronic applications.
**CO3:** Student will be able to compare, analyze and find suitable applications within the different electronic and optoelectronic devices in different fields of electronics.
**CO4:** Student will be to develop the understanding regarding application of elementary ideas of electrical and electronics in modern technology.

## Course Content:

| Module No. | Description | Hours | Blooms Level | PO(1..12) Mapping |
|---|---|---|---|---|
| **PCCEC 301.1** | **Semiconductor Electronics and Statistics :** Fermi-Dirac Statistics, Fermi and Quasi-Fermi Level, Drift and Diffusion, Conductivity and mobility, Density of states and carrier concentration, Generation and recombination of carriers, Semiconductor equations, Poisson and Continuity equations, Hall effect, IC fabrication (Elementary discussion of different steps) | 8 | L2 (Understand) L4 (Analyse) | PO1, PO2, PO8,PO12 |
| **PCCEC 301.2.a** | **Junctions and Contacts:** p-n junction:- operation and energy band diagram, junction capacitance and frequency limitation; tunnel diode, Zener diode and breakdowns, Heterojunction:- operation and band diagram, Ohmic and Schottky contacts. | 6 | L3 (Apply) L4 (Analyze) | PO1,PO2, PO3, PO4, PO5,PO12 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: ELECTRONIC DEVICES**
**SUBJECTCODE: PCCEC301**

| | | | | |
|---|---|---|---|---|
| **PCC EC 301.2.b** | **Bipolar junction transistors (BJT)**: Construction, operation and band diagram,BJT configurations, load line and Q-point, Amplification, Leakage currents, Early effect, Small signal-low frequency hybrid parameter model, Ebers-Moll equivalent circuit model, frequency limitation. | 5 | L2 (Understand) L4 (Analyze) | PO1,PO2, PO3,PO8, PO12 |
| **PCC EC 301.3** | **Field effect diode and transistors**: JFET:- structure, operation and Pinch-off voltage; MIS diode, MOSFET :- structure and operation of concept of accumulation, depletion and inversion with band bending, Threshold voltage: expression and dependencies, drain current equation in terms of W/L (no derivation), drain current characteristics, small signal model, C-V characteristic of ideal MOS capacitor, channel length modulation, MOS scaling and short channel effects (brief introduction), Substrate bias effect, CMOS working principle and switching, frequency limitations. | 8 | L3 (Apply) L4 (Analyze) | PO1,PO2, PO3, PO4, PO5,PO8, PO12 |
| **PCC EC 301.4** | **Opto Electronic Devices**: Optical absorption:- absorption coefficient and cut-off wavelength, Luminescence, photovoltaic effects, p-n junction solar cell (operating principle only) , Photoconductors, Photodiode, PIN photodiode, avalanche photodiode, phototransistor, LED, semiconductor junction Laser, Fibre Optic:- construction and principle of action (elementary discussion only) | 6 | L2 (Understand) L3 (Apply) | PO1,PO2,. PO3, PO4, PO5,PO12 |
| **PCC EC 301.5** | **Microwave Devices:** Structure, Characteristics, Operation:- PIN diode, Varactor diode, MESFET, HEMT, Charge Coupled Devices (CCD), Gunn Diode, IMPATT diode | 4 | L2 (Understand) L4 (Analyze) | PO1,PO2, PO3,PO12 |

**Text books:**


Ben G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices",

**1.** PHI Learning Pvt. Ltd., 6th edition, 2011.

Michael Shur "Physics of Semiconductor Devices", Prentice Hall, India

**2.**

**3.** D A Neamen and D. Biswas "Semiconductor Physics and Devices," McGraw-HillEdition, 4th.Edition.

**4.** B.L.Anderson and R.L.Anderson, "Fundamentals of Semiconductor Devices"

**5.** P.Bhattacharya, "Semiconductor optoelectronic devices", Prentice Hall India

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT DIGITAL SYSTEM DESIGN**
**SUBJECT CODE: (PCCEC302)**

| | |
|---|---|
| **Subject Code** : PCCEC302 | **Category**: Professional Core courses |
| **Subject Name** : Digital Electronic Circuits | **Semester** : 3rd |
| **L-T-P** : 3-0-0 | **Credit:3** |
| **Pre-Requisites:** Analog Electronics, Basic Computing | |

## Course Objective:

1. To introduce basic postulates of Boolean algebra and to introduce the methods for simplifying Boolean expressions.
2. To study formal procedures for the analysis and design of combinational and sequential circuits.
3. To introduce the concept of logic families, semiconductor memories and implementation of digital circuits using programmable logic devices.
4. To illustrate the concept of synchronous and asynchronous sequential circuits.

## Course Outcome:

**CO1:** Students will have a thorough knowledge of number system and different codes and also they will be able to apply that knowledge while required.
**CO2:** After completing this course, the students will be able to design and analyze combinational logic circuits.
**CO3:** Students will acquire knowledge about sequential circuits and memory systems.
**CO4:** They will be able to design ADC and DACand also they will acquire knowledge on logic families.

## Course Content:

| Module No. | Description of Topic | Blooms Level | PO (1..12) MAPPING | Contact Hrs |
|---|---|---|---|---|
| 1 | **Number systems and Boolean algebra:** Introduction to number system and Boolean algebra; Binary, Octal and Hexadecimal representation and their conversions; BCD,ASCII, EBCDIC, Gray codes and their conversions; Signed binary number representation with 1's and 2's complement methods ,Boolean identities, basic logic functions, standard forms of logic expressions, simplification of logic expressions using K Map and Boolean theorems. | L1 (Remember) L2 (Understand) | PO1, PO2, PO3, PO4, PO12 | 6 |

| | | | | |
|---|---|---|---|---|
| 2 | **Logic families:**<br>TTL, ECL, MOS and CMOS, their operation and specifications. | L2<br><br>(Understand) L3 (Apply) | PO1, PO2, PO3, PO4, PO12 | 3 |
| 3 | **Combinational logic:**<br>Arithmetic circuits (ADDER and SUBTRACTOR), Comparators, decoders, encoders, multiplexers, de multiplexers, and their use in logic synthesis; Hazards in combinational circuits. | L3 (Apply) L4 (Analyse) | PO1, PO2, PO3, PO4, PO12 | 6 |
| 4 | **Sequential Circuits:**<br>Basic memory element-S-R, J-K, D and T Flip Flops, various types of Registers and counters and their design, Irregular counter, State table and state transition diagram, sequential circuits design methodology. | L3 ( Apply), L4 (Analyse) | PO1, PO2, PO3, PO4, PO12 | 6 |
| 5 | Introduction of ROM and RAM, PLA, PAL and FPGA. | L3 (Apply) | PO1, PO2, PO3, PO4, PO12 | 4 |
| 6 | Analog and Digital Data Conversions, D/A converter specifications - weighted resistor type, R-2R Ladder type.<br>A/D Converters specifications - Flash type - Successive Approximation type - Single Slope type– Dual Slope type. | L3 (Apply) | PO1, PO2, PO3, PO4, PO12 | 5 |
| **Total Hours:** | | | | 30 |

**Learning Resources:**

1. A. Anand Kumar, Fundamentals of Digital Circuits, PHI
2. R.P. Jain,Modern Digital Electronics, Tata McGraw Hill, 4th edition, 2009. 3. S. Salivahanan and S. Arivazhagan,Digital Circuits and Design,Oxford University Press, fifthedition.
M. Morris Mano ,"Digital Design" , Pearson
4.
W.H. Gothmann, "Digital Electronics 5. - An introduction to and practice", PHI, theory
2nd edition, 2006.
D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1985
6.
7. Charles H. Roth and , "Digital System Design using VHDL", Lizy Kurian John second edition, Cenage Learning.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: SIGNALS AND SYSTEMS**
**SUBJECT CODE: PCCEC303**

| | |
|---|---|
| **Subject Code :** PCCEC303 | **Category** : Professional Core courses |
| **Subject Name** : Signals and Systems | **Semester** : 3rd |
| **L-T-P** : 3-0-0 (Total Contact Hrs. 3) | **Credit:** 3 |
| **Pre-Requisites:** School level mathematics: Sequence and series, algebra of complex numbers, ba sic trigonometry. Calculus: Differential and Integral calculus (single variable). Knowledge of dif ferential equations is helpful but not required.<br>Co-requisites: Basic circuit analysis ohm's law, KVL, KCL. | |

## Course Objective:

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. To understand Sampling theorem, with time and frequency domain analysis of continuous time signals with Fourier series, Fourier transform and Z transform.
3. To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.
4. To understand the basic concepts of state space representation of a system and conversion of transfer function model into state space and vice versa.

## Course Contents:

| Module No. | Description of Topic | Contact Hrs. |
|---|---|---|
| 1 | Signals and systems as seen in everyday life, and in various branches of engineering and science.<br>Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift- invariance, causality, stability, realizability.<br>Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs. Characterization of causality and stability of linear shift invariant systems. System representation through differential equations. | 10 |
| 2 | Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and orthogonal bases.<br>Evolution of Transforms: Fourier Transform, Laplace Transform, Z transform (single sided and Double sided). | 8 |

| | | |
|---|---|---|
| | The Laplace Transform, notion of Eigen functions of LSI systems, a basis ofEigen functions, region of convergence, poles and zeros of system, solu tion to differential equations and system behavior using Laplace Trans formation. | |
| 3 | The z-Transform for discrete time signals and systems- Eigen functions,region of convergence, z-domain analysis.<br>The Sampling Theorem and its implications, Spectra of sampled signals.Reconstruction: ideal interpolator, zero-order hold, first-order hold, and soon. Aliasing and its effects. Relation between continuous and discrete timesystems. | 12 |
| 4 | State-space representation of systems. State-Space analysis, Multi-input, multi-output representation. State Transition Matrix and its role. | 10 |

## Books Recommended:

1. B. P. Lathi, "Signal Processing and Linear Systems", Oxford Universiy Press, c1998.
2. Douglas K.Lindner, "Introduction to Signals and Systems", McGrawill International Edition.
3. Simon Haykin, Barryvan Veen, "Signals and Systems", John Wiley and Sons (Asia).
4. Robert A. Gabel, Richard A. Roberts,"Signals and Linear Systems", John Wiley and Sons,1995.
5. M. J. Roberts, "Signals and Systems Analysis using Transform methods and MATLAB",TMH.
6. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi,2001.
7. Ashok Ambardar, "Analog and Digital Signal Processing", 2nd Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company),1999. 8. R. Anand, Signals and Systems, Khanna Publishing House,2018.

## Course Outcomes:

| Sl. No. | DESCRIPTION | Blooms Level |
|---|---|---|
| | Students will be able to: | |
| **PCCEC 303A.1** | Ability to Infer the different types of CT and DT signals from their mathematical / graphical representations and classify them into various categories. Ability to characterize random signals using their statistical properties | L1 (Remember) L3 (Apply) |
| **PCCEC 303A.2** | Ability to analyze the CT and DT signals in time domain and frequency domain to infer their characteristics. Ability to apply the acquired knowledge to classify CT and DT systems into various categories | L2 (Understand) |
| **PCCEC 303A.3** | Ability to determine the response of a system for a given input using time domain and frequency domain techniques | L3 (Apply) |
| **PCCEC 303A.4** | Ability to select the appropriate transform technique for the analysis of a given CT or DT system. | L2 (Understand) |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT NETWORK THEORY**
**SUBJECT CODE-(PCCEC304)**

| | |
|---|---|
| **Subject Code** : PCCEC304 | **Category**: Theory (GE) |
| **Subject Name** :Network Theory | **Semester** : 3rd |
| **L-T-P** : 3-0-0 (Total Contact Hrs. 3) | **Credit:**3 |
| **Pre-Requisites:** Mathematics,Basic Electronics and Electrical | |

## Course Objectives:

1. To learn about different types of network theorem and to apply this knowledge in circuit analysis.
2. To learn about transient response of a circuit.
3. To understand the application of Laplace transform and graph theory in circuits. 4. To learn about the resonating nature of a circuit.
5. To learn the Two pot parameters and their applications in circuit

## Course Outcomes:

1. After completing this course, the students will be able to analyse a circuit with respect to node voltages and currents.
2. They will be able to understand the transient and steady state response of the circuit. 3. They will be able to analyse resonating and coupled circuits.
4. They will be able to analyze simple two-port circuit and analyze circuits using graph theory.

## Course Content:

| Module no and CO mapping | Description | level | PO (1..12) MAPPING |
|---|---|---|---|
| 1 (**PCCEC304.1**) | **Network Theorems:** Basic nodal and mesh analysis, linearity, superposition and source transformation, power transfer theorem and useful circuit analysis techniques, Tallegen's theorem, network topology | 1,2,3,4 | 1,2,3 |
| 2 (**PCCEC304.2**) | **Transient Analysis:** Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidalexcitation | 3,4 | 1,2,3,4 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT NETWORK THEORY**
**SUBJECT CODE-(PCCEC304)**

| | | | |
|---|---|---|---|
| 3 (**PCCEC304.2**) | **Laplace Transform and Its Circuit Applications:**<br>a) Laplace transform, initial and final value theorem, circuit analysis in sdomain, frequencyresponse.<br><br>b) Waveform synthesis, analysis of RC, RL, and RLC networks with and withoutinitial conditions with Laplace transforms evaluation of initialconditions.<br><br>Concept of pole, zero and transferfunction | 2,3,4 | 1,2,3,4,5 |
| 4 (**PCCEC304.3**) | **Resonanceand Coupled Circuits:**<br>a) **Resonance** - Series resonance - Parallel resonance - Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency Bandwidth - Q factor -Selectivity.<br>b) **Self-inductance** - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multi winding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupledcircuits. | 2,3,4 | 1,2,3,4 |
| 5 (**PCCEC304.4**) | **TwoPort Networks:**<br>Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid (H) Parameters,Interconnection of twoportnetworks, Symmetricityand reciprocity conditions. | 2,3,4 | 1,2,3,4 |
| 6 (**PCCEC304.4**) | **Graph Theory in Circuits:**<br>Graph of a network - Incident and reduced incident matrices Trees Cut sets - Fundamental cut sets Cut set matrix Tie set matrix | 3,4 | 1,2,3,4 |

## Learning Resources:

### Text Books:


1. V. Valkenbeg, Network Analysis, Pentice Hall India
2. D Roy Chowdhury,Networks and Systems,New Age InternationalPublishers 3. Sudhakar, A., -Hill New Delhi,1994.
4. -HillEducation


### Reference Books:


5. Fundamentals of Electric Circuits, Charles K. Alexander,McGraw Hill
6. Network Analysis and Synthesis, S Ghosh, A. Chakraborty

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: MATHEMATICS- III**
**SUBJECT CODE: BSC301**

| | |
|---|---|
| **Subject Code :** BSC301 | **Category** : Theory |
| **Subject Name** :Mathematics - III | **Semester** : 3rd |
| **L-T-P:** : 3-0-0 | **Credit:** 3 |
| **Pre-Requisites:** BSC-103, BSC-203 | |

## Course Objective:

1. Identify different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems. 2. Illustrate the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment.
3. Categorize statistical tools for analyzing data samplesand apply linear regression models in practice, and identify situation where linear regression is appropriate. 4. Interpret the ideas of bi-variate distributions with their properties and the applications in physical and engineering environment.

## Course Outcomes:

**CO1:** Students will be able to solve problems involving steady state heat flow, electrostatics, magnetism, current flow etc. by transforming an irregular domain, where it is difficult to study behavior, of a complex function onto a domain, where the analysis becomes relatively simple. Also they will be able to evaluate some complicated real integrals and study the behavior of the functions near singularities.

**CO2:** Students will be able to store the records in hash table in Data Structure having the knowledge of hash functions for chaining and open addressing. They will be able to learn empirical listing of outcomes and probabilities obtained from a mathematical model representing some phenomenon of interest.

**CO3:** Students will learn to transform a given set of quantitative data into meaningful information to help in decision making. They will be able to study the characteristics of a whole population from which the data is obtained.

**CO4:** Students will be able to predict how well their designs will perform to their specifications before moving on to full scale production of the designs.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: MATHEMATICS- III**
**SUBJECT CODE: BSC301**

## Course Contents:

| Module No. | Description of Topic | Contact Hrs. | Blooms Level | PO (1-12) Mapping |
|---|---|---|---|---|
| 1 | **Calculus of Complex Functions:** Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm)and their properties; Conformal mappings, Mobius transformations and their properties. Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral Maximum-Modulus theorem (without proof); Residue theorem (without proof), Evaluation of definite integral involving sine and cosine functions, Evaluation of certain improper integrals using the Bromwich contour. | 16 | L2 (Understand) L3 (Apply) L5 (Evaluate) | PO1, PO2, PO3, PO5, PO10 |
| 2 | **Random Variable & Probability Distributions:** Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality. Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. | 12 | L2(Understand) L3 (Apply) L4 (Analyze) | PO1, PO2, PO3, PO5, PO12 |
| 3 | **Basic Statistics:** Measures of Central tendency and dispersion: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression Rank correlation. | 8 | L2(Understand) L3 (Apply) L4 (Analyze) | PO1, PO2, PO3, PO6 |
| 4 | **Bi-variate Distributions:** Bi-variateprobability distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule. | 4 | L2 (Understand) L3 (Apply) | PO1, PO2, PO3, PO4, PO5 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: MATHEMATICS- III**
**SUBJECT CODE: BSC301**

## Books Recommended:


1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc Graw Hill,2004.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
6. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
7. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002. 8. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
9. Lipschutz S., and Lipson M.L.: Probability (Schaum's Outline Series), TMH.
10. John E. Freund, Ronald E. Walpole, Mathematical Statistics, Prentice Hall.


**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT ESSENTIAL STUDIES FOR PROFESSIONALS III**
**SUBJECT CODE: HSMC302**

| | |
|---|---|
| **Subject Code** : HSMC302 | **Category**: Theory |
| **Subject Name** : Essential Studies For Professionals - III | **Semester** : 3rd |
| **L-T-P** : 2-0-0 (Total Contact Hrs. 2) | **Credit:** 2 |
| **Pre-Requisites:** Basic Social Science from primary to high school, NCERTs | |

## Course Objective:

1. To learn about basic of history to know about our past and to implement it in our daily life.
2. To learn about the political system of our country.
3. To learn the concepts of Basics of Geography and Economics from which Students will acquire knowledge for Competitive exams.

## Course Outcomes:

1. To inculcate human values and ethical thinking among students.
2. To prepare the stage for facing different levels of civil service and other competitive examinations.
3. To prepare the ground for making them aware of the happenings, cultural historical and developmental aspects of the country as well as global affairs
4. Learning current affairs with technique.

**Course Content:**

| Module No. | Description | Hours | Blooms Level | PO(1..12) Mapping |
|---|---|---|---|---|
| 1. | **GK & CA and National income**: Concept of GDP, GNP, NNP both in FC & MP, PCI | 6 | L1 (Remember) L2 (Understand) L4 (Analyse) | PO1,PO2, PO3,PO4 |
| 2. | **Tax, Inflation & Deflation and Market structure:** Concept of TAX, objective of TAX, Direct & Indirect Tax, Progressive, Regressive & Proportional tax. Inflation & its impact, Deflation & its impact, WPI, CPI, GDP deflator. -Perfect competition, monopoly, oligopoly, duopoly, monophony, duopoly, Oligopoly. SEBI, IRDA, NHB Working & Policies, Money Market & Capital Market, functions of Banks & Types of accounts, cheques & loans, Mutual Fund, Banking Terminologies.. | 12 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO4 |

## INSTITUTE OF ENGINEERING & MANAGEMENT
## (AUTONOMOUS INSTITUTION)
## SUBJECT ESSENTIAL STUDIES FOR PROFESSIONALS III
## SUBJECT CODE: HSMC302

| | | | | |
|---|---|---|---|---|
| 3. | **Constitution of India:** Supreme Court, High Court, Local Self Government.<br>1. Science & technology (with currentupdates).<br>2. Monuments, sculptures<br>3. Literature, Languages<br>4. Visual arts paintingsetc.<br>5. Performing arts classical and folk dances, puppetryetc.<br>6. Religiousdiversity | 12 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO4 |
| 4. | **History:** Ancient & Medieval History at a glance- From Indus valley civilization to Pre-Foreign (British, Dutch, French) Invasion. | 6 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO4 |

## Learning Resources:

**Text Books:**

1. NCERT Books from class 8-12.

**Reference Books:**

1. Indian Constitution-M.Laxmikant
2. Indian Economy-RameshSingh
3. History of Modern India- BepanChandra
4. Geography of India- MajidHussain
5. Current Affairs Magazine ofIEM-UEM

**INSTITUTE OF ENGINEERING&MANAGEMENT**
**(AUTONOMOUSINSTITUTION)**
**SUBJECT: ELECTRONIC DEVICES LABORATORY**
**SUBJECTCODE: PCCEC391**

| | |
|---|---|
| **SubjectCode:** PCCEC391 | **Category** : Core Course |
| **SubjectName**: Electronic Devices Laboratory | **Semester** : 3rd |
| **L-T-P** :0-0-2 (Total Contact Hrs.2) | **Credit:** 1 |
| **Pre-Requisites:**1. Basic Electronics 2. Basic Physics | |

## Course Objective:

1. To get practical experience with the different electronic devices being used by Electronics Engineers.

2. To get practical experience of the basic characteristics of different opto-electronic devices and to be able to apply this knowledge in various other applications. 3. To learn hand on experience such that students can work as professionals in the area of Electronics and other Engineering fields.

## Course Outcomes:

1. An ability to verify the working of different diodes, transistors, CRO probes and measuring instruments. Identifying the procedure of doing the experiment.
2. Ability to understand the characteristics of BJT and FET and how to determine different parameters for designing purpose.
3. Ability to understand properties of photoelectric devices
4. Ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.

| Module No. | Description | Hours | Blooms Level | PO(1..12) Mapping |
|---|---|---|---|---|
| 1 | Identifying and study of different components like resistor, capacitors, diodes, LED, Transistors, FET(JFET & MOSFET)etc | 2 | L2 (Understand) L4 (Analyse) | PO1,PO5 |

| | | | | |
|---|---|---|---|---|
| 2 | Study of different instruments used in the laboratories like, power supply, Oscilloscope, Multi-meter etc. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO5 |
| 3 | **Characteristics of PN junction diode:**<br>a)To Plot the Volt Ampere Characteristics of PN Junction Diode under Forward and Reverse Bias Conditions.<br>b) To find the Cut-in voltage, Static Resistance, Dynamic Resistance for Forward Bias & Reverse Bias. | 2 | L2 (Understand) | PO1,PO5 |

**INSTITUTEOFENGINEERING&MANAGEMENT**
**(AUTONOMOUSINSTITUTION)**
**SUBJECT: ELECTRONIC DEVICES LABORATORY**
**SUBJECTCODE: PCCEC391**

| | | | | |
|---|---|---|---|---|
| 4 | **Characteristics Of Zener Diode & Load regulation:**<br>a) To Obtain the Forward Bias and Reverse Bias characteristics of a Zener diode.<br>b) Find out the Zener Break down Voltage from the Characteristics.<br>c)To Obtain the Load Regulation Characteristics. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO3, PO5 |
| 5 | **Common Base Bipolar Transistor Characteristics:**<br>a) To plot the Input and Output characteristics of a transistor connected in Common Base Configuration<br>b) To find the h parameters from the characteristics. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO5 |
| 6 | **Common Emitter Bipolar Transistor characteristics:**<br>a) To plot the Input and Output characteristics of a transistor connected in Common Emitter Configuration<br>b) To find the h parameters from the characteristics | 2 | L3 (Apply) L4 (Analyze) | PO1, PO5 |
| 7 | Design Self Bias Bjtcircuit | 2 | L3 (Apply) L4 (Analyze) | PO1, PO3, PO5 |
| 8 | **JFET Drain & Transfer Characteristics(Common Source):**<br>a) Drain characteristics<br>b) Transfer Characteristics.<br>c) | 2 | L2 (Understand) L4 (Analyze) | PO1, PO3, PO5 |
| 9 | Study Characteristics of Phototransistor | 2 | L2 (Understand) L4 (Analyze) | PO1, PO5 |
| 10 | Study Characteristics of LED &LDR | 2 | L2 (Understand) L4 (Analyze) | PO1, PO5 |

**Text books:**

**1.**
Learning Pvt. Ltd., 6th edition, 2011.

**2.**

**3.** D A Neamen and D. Biswas "Semiconductor Physics and Devices," McGraw HillEdition, 4th. Edition.

**4.**

**5.**

## INSTITUTE OF ENGINEERING & MANAGEMENT
## (AUTONOMOUS INSTITUTION)
## SUBJECT DIGITAL SYSTEM DESIGN LABORATORY
## SUBJECT CODE: PCCEC392

| | |
|---|---|
| **Subject Code** : PCC-EC 392 | **Category**: Professional Core courses |
| **Subject Name** : Digital Electronic Circuits | **Semester** : 3rd |
| **L-T-P** : 3-0-0 | **Credit:** 3 |
| **Pre-Requisites:** Digital Electronics | |

## Course Objective:

1. To get practical experience with the different basic and universal gates.
2. To get practical experience of designing any logic circuit using basic gates and universal gates.
3. To learn hand on experience such that students can work as professionals in the area of Digital electronics and other Engineering fields.

## Course Outcomes:

**CO1:** Students will have a thorough knowledge of different types of gates and simplification technique.

**CO 2:** After completing this course, the students will be able to analyze and design any combinational logic circuits.

**CO 3:** After completing this course, the students will be able to analyze and design any sequential logic circuits.

**CO 4:** They will be able to design and analyze different types of inverter circuits.

**Course Content:**

| Module No. | Description of Topic | Blooms Level | PO (1..12) MAPPING | Contact Hrs. |
|---|---|---|---|---|
| 1(CO1) | Introduction to Digital Electronics Lab Nomenclature of Digital ICs, Specifications. | L2,L3 | 8,9,12 | **2** |
| 2(CO1) | Study of the Data Sheet, Concept of Vcc and Ground, Verification of the Truth Tables of Logic Gates using TTL ICs. | L2,L3 | 8,9,12 | **2** |

| | | | | |
|---|---|---|---|---|
| 3(CO1) | Implementation of the Given Boolean Functions using Logic Gates in Both SOP and POS Forms. | L2,L3, L4 | 8,9,12 | **2** |
| 4(CO1) | Simplification of logic functions using K Map and Boolean algebra and then design using basic gates and universal gates. | L2,L3, L4 | 8,9,12 | **2** |
| **5**(CO2) | Design of Half adder and Full adder circuits and alsosubtractor design. | L2,L3, L4 | 8,9,12 | **2** |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT DIGITAL SYSTEM DESIGN LABORATORY**
**SUBJECT CODE**: **PCCEC392**

| | | | | |
|---|---|---|---|---|
| 6(CO2) | Design of BCD Adder using IC 7483. | L2,L3, L4 | 8,9,12 | **2** |
| 7(CO2) | Design of MUX and DEMUX using basic gates. | L2,L3, L4 | 8,9,12 | **2** |
| 8(CO2) | Implement logic functions like Adder, Substractor usingMUX, ICs. | L2,L3, L4 | 8,9,12 | **2** |
| 9(CO3) | Design of R-S,J-K,D,T Flip flop using universal gates andalso study master slave JK flip flop IC. | L2,L3, L4 | 8,9,12 | **2** |
| 10(CO3) | Design of synchronous and asynchronous counter using flipflop. | L2,L3, L4 | 8,9,12 | **2** |
| 11(CO4) | Simulation of MOS Inverter with different loads using SPICEsoftware. | L2,L3, L4 | 8,9,12 | **2** |
| 12(CO4) | Simulation of CMOS Inverter for different parameters Kn,Kp as a design variable in suitable circuit simulator software. | L2,L3, L4 | 8,9,12 | **2** |
| **Total Hours:** | | | | **24** |

**Learning Resources:**


1. A. Anand Kumar, Fundamentals of Digital Circuits, PHI
2. R.P. Jain,Modern Digital Electronics, Tata McGraw Hill, 4th edition, 2009. 3. S. Salivahanan and S. Arivazhagan,Digital Circuits and Design,Oxford University Press, fifthedition.

4.

5. - An introduction to theory

2nd edition, 2006.

6.

7. Charles H. Roth and Lizy Kurian John second edition, Cenage Learning.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: SIGNALS & SYSTEMS LAB**
**SUBJECT CODE: (PCCEC393)**

| | |
|---|---|
| **Subject Code** : PCCEC393 | **Category** : Professional Core course |
| **Subject Name** : Signals & Systems Lab | **Semester** : 3rd |
| **L-T-P** : **0-0-2 (Total Contact Hrs. 2)** | **Credit :** 1 |
| **Pre-Requisites:** Mathematics, Network Theory | |

## Course Objective:

1. Understanding of Signals and Systems is essential for a proper appreciation and application of other parts of electronics engineering, such as Digital Signal Processing, Analog and Digital Communication systems to be taught in the forthcoming semesters.
2. The course lays the mathematical foundation for the study of signals and systems, classification of signals - continuous time and discrete time signals and properties of systems.
3. Helps the students in dealing with signals in both time and frequency domains and responses of the LTI systems in both time and frequency domains.
4. This subject, which consolidates and expands student knowledge from basic mathematics, constitutes an essential conceptual framework from which to understand a variety of engineering systems.
5. The subject also deals with introductory ideas on the topics of filtering, sampling, Z Transform and Laplace Transform.

## Course Content:

| Module No. | Description of Topic | Contact Hrs. | Blooms Level | PO(1..12) Mapping |
|---|---|---|---|---|
| 1. | Study to identify the basic differences between continuous and discrete time signals & systems. | 2 | L2 (Understand) | PO1, PO5 |
| 2. | Study to simulate the signals (sinusoidal, impulse, ramp and step signals) in Matlab/Octave. | 2 | L2 (Understand) L3 (Apply) | PO1, PO5 |
| 3. | To study Linear convolution theorem in time and frequency domain in Matlab / Octave. | 2 | L2 (Understand) L3 (Apply) | PO1, PO5 |
| 4. | Fourier & Laplace transform of different signals. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO2, PO5 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: SIGNALS & SYSTEMS LAB**
**SUBJECT CODE: (PCCEC393)**

| | | | | |
|---|---|---|---|---|
| 5. | Verification of sampling theorem .To study of sampling of an analog Signal and it s effects with different sampling rates(over, under and critical sampling cases) | 2 | L3 (Apply) L4 (Analyze) | PO1, PO2,PO5 |
| 6. | Z-transform of different discrete time signals. Correlation of two signals (auto correlation & cross correlation). | 2 | L2 (Understa nd) L3 (Apply) | PO1, PO2 PO5 |
| 7. | Design of a first order low-pass filter with given cut- off frequency. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO3 |
| 8. | Design of a first order high-pass filter with given cut- off frequency. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO3 |
| 9. | Design of a first order band-pass filter with given cut- off frequency. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO3 |
| 10. | Design of a first order band-reject filter with given cut- off frequency. | 2 | L3 (Apply) L4 (Analyze) | PO1, PO3 |

## Course Outcomes:

1. Ability to identify the basic differences between continuous and discrete time signals & systems and analyze it both time and frequency domain.
2. Ability to apply Laplace transform and Z transform in the analysis of continuous time and discrete time signals and systems.
3. Ability to compute the output of a LTI system (both continuous and discrete time) by convolution and sampling of continuous time signals and verification of the same.
4. Ability to design suitable active filters of first order(LPF,HPF and BPF) required for signal processing applications.

## Learning Resources:

1. Laboratory manual provided from the organization.
2. a)Signals and Systems:Allen Opphenium,Wilsky,
   b)Signals and Systems:Simon Haykin,Vary Veen.
3. MATLAB/https://octave-online.net.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: DATA STRUCTURES AND ALGORITHMS**
**(SESSIONAL)**
**SUBJECT CODE: OECEC381**

| | |
|---|---|
| **Subject Code**: OEC-EC381 | **Category**: Engineering Sciences |
| **Subject Name** : Data Structures and Algorithms | **Semester** : 3rd |
| **L-T-P** : **1-0-2** | **Credit: 2** |
| **Pre-Requisites:** Mathematics-I & II, Programming with C | |

## Course Objectives

1. To learn fundamental data structures, which allow one to store collections of data with fast updates and queries. The student will be able to design, analyse, and implement data structures and algorithms using computer programs, and to solve engineering problems.
2. Topics include elementary data structures (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, searching and sorting techniques and their comparative time and space complexities, and their application to solving practical engineering problems
3. Students are expected to be capable of understanding the data structures, their advantages and drawbacks, how to implement them in C, how their drawbacks can be overcome and what the applications are and where they can be used. students should be able to learn about the data structures/ methods/algorithms mentioned in the course with a comparative perspective so as to make use of the most appropriate data structure/ method/algorithm in a program to enhance the efficiency (i.e. reduce the run-time) or for better memory utilization, based on the priority of the implementation.
4. Students will be able to understand the efficiency aspects of the graph and sorting algorithms covered in this course, and be able to convert an inefficient program into an efficient one using the knowledge gathered from this course.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: DATA STRUCTURES AND ALGORITHMS**
**(SESSIONAL)**
**SUBJECT CODE: OECEC381**

**Course Contents:**

| Module | Topics | Contact Hours |
|---|---|---|
| 1 | **Basic Terminologies:** Elementary Data Organizations. Why we need data structure? Concepts of data structures: a) Data and data structures b) Abstract Data Type and Data Type. **Algorithms and programs**: basic idea of pseudo-code. . **Algorithm efficiency and analysis**: time and space analysis of algorithms Order notations, Asymptotic Notations, Time-Space trade off. **Text Book** (1), Chapter 2; **Text Book** (2), Chapters 1 & 2; **Text Book** 3), Chapter 1 | 4 |
| 2 | **Linear Data Structures - I** **Array**s: Different representations row major, column major.Sparse matrix - its implementation and usage. Array representation of polynomials. **Text Book** (1), Chapter 3; **Text Book** (2), Chapter 4; **Text Book** (3), Chapter 2 **Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list:operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis. **Text Book** (1), Chapter 6; **Text Book** (2), Chapter 5; **Text Book** (3), Chapter 4 | 8 |
| 3 | **Linear Data Structures II** Stacks and Queues: Stack and its implementations (using array, using linked list), applications. Queue, circular queue, dequeue. Implementation of queue-both linear and circular (using array, using linked list),applications. Recursion: Principles of recursion use of stack, differences between recursion and iteration, tail recursion. Applications - The Tower of Hanoi, Eight Queens Puzzle. **Text Book** (1), Chapters 7 & 8; **Text Book** (2), Chapter 6; **Text Book** (3), Chapter 3 | 8 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: DATA STRUCTURES AND ALGORITHMS**
**(SESSIONAL)**
**SUBJECT CODE: OECEC381**

| | | |
|---|---|---|
| **:Nonl 4** | **Non -Linear Data Structures:**<br>**Graphs:** Graph definitions and concepts (directed/undirected graph, weighted/un weighted edges, sub-graph, degree, cutvertex/articulation point, pendant node, clique, complete graph, connected components strongly connected component, weakly connected component, path, shortest path, isomorphism). Graph representations/storage implementations adjacency matrix, adjacency list, adjacency multi-list. Graph traversal and connectivity Depth-first search (DFS), Breadth-first search (BFS) - concepts of edges used in DFS and BFS (tree edge, backedge, cross-edge, forward-edge), applications. Minimal spanning tree algorithm (basic idea of greedy methods).<br>**Text Book** (1), Chapter 13; **Text Book** (2), Chapter 8; **Text Book** (3), Chapter 6<br>**Trees**: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree,Tree operations on each side of the trees and their algorithms with complexity analysis, Applications of Binary Trees, B Tree, B+ Tree: definitions, algorithms and analysis<br>**Text Book** (1), Chapter 9; **Text Book** (2), Chapter 7 | **8** |
| **5** | **Searching, Sorting and Hashing**<br>**Searching and Sorting**: Linear Search and Binary Search Techniques and their complexity analysis. Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods.<br>**Text Book** (1), Chapter 14; **Text Book** (2), Chapter 9; **Text Book** (3), Chapter 7<br>**Hashing:** Hashing functions, Hashing for insert, search, delete, collision resolution techniques<br>**Text Book** (1), Chapter 15; **Text Book** (2), Chapter 9; **Text Book** (3), Chapter 8 | **8** |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: DATA STRUCTURES AND ALGORITHMS**
**(SESSIONAL)**
**SUBJECT CODE: OECEC381**

**Text Books:**

1. **Data Structures Using C (2nd edn) ReemaThareja**(publ.: Oxford University Press)
2. **Data Structures With C Seymour Lipschutz** (publ.: McGraw Hill Education) 3. **Fundamentals of Data Structures In C (2nd edn) Horowitz, Sahni, and Anderson Freed** (publ.: Universities Press)

**Reference Books:**

1. Data Structures In C A. Tenembaum, Y. Langsam, and M. J. Augenstein (publ.: Pearson) 2. Classic Data Structures (2nd edn) DebasisSamanta (publ.: PHI)
3. Data Structures & Algorithms Aho, Hopcroft, and Ullman (publ.: Pearson)

## Lab Course Contents:

| S. No. | Description of Topic | Contact Hrs. |
|---|---|---|
| 1 | Implementation of array operations. | 2 |
| 2 | Stacks and Queues: adding, deleting elements Circular queue: Adding and deleting elements merging problem. | 2 |
| 3 | Implementation of singly and double Linked list: inserting, deleting, and inverting a linked list. | 2 |
| 4 | Implementation of stack and queues using linked list: | 2 |
| 5 | Polynomial addition and multiplication. | 2 |
| 6 | Sparse Matrices: Multiplication and Addition. | 2 |
| 7 | Recursive and Non-recursive traversal of Trees. Threaded binary tree traversal. AVL tree implementation | 2 |
| 8 | Application of Trees. Application of sorting and searching algorithms. | 2 |
| 9 | Hash tables implementation: searching, inserting and deleting, searching & sorting techniques. | 2 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: DATA STRUCTURES AND ALGORITHMS**
**(SESSIONAL)**
**SUBJECT CODE: OECEC381**

**Course outcomes (CO):**

| COURSE OUTCOMES: S.NO. | DESCRIPTION | Blooms Level | PO (1..12) MAPPING |
|---|---|---|---|
| OECEC381.1 | For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness | L4 Analyze | PO1, PO2, PO3, PO4, PO5, PO12 |
| OECEC381.2 | For a given problem of Arrays,Linked Lists, Stacks, and Queues, student will be able to implement it and analyze the same to determine the computation time complexity. | L4 Analyze | PO1, PO2, PO3, PO4, PO5, PO12 |
| OECEC381.3 | Students will able to implement Graph search and traversal algorithms and determine the time and computation complexity<br>error detection and correction in linear block codes | L4 Analyze | PO1, PO2, PO3, PO4, PO5, PO12 |
| OECEC381.4 | For a given Search problem (Linear Search and Binary Search) student will able to implement and analyze the same to determine the computation time complexity. For Sorting, student will able to select and write the appropriate optimized algorithms from among Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity | L4 Analyze | PO1, PO2, PO3, PO4, PO5, PO12 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT - SKILL DEVELOPMENT FOR PROFESSIONALS III**
**SUBJECT CODE - HSMC382**

| | |
|---|---|
| **Subject Code** : HSMC382 | **Category**: |
| **Subject Name** : Skill Development forProfessionals - III | **Semester** : 3rd |
| **L-T-P** : 2-0-0 (Total Contact Hrs. 2) | **Credit:**1 |
| **Pre-Requisites:** Basic Mathematics, General English from primary to high school. | |

## Course Objective:

1. To enhance the aptitude & analytical skill of students with multiple tricky approaches.
2. To prepare the students for various competitive examinations & professional exams

## Course Outcomes:

1. To enhance their problem solving skills, to improve the basic mathematical & Logical Skills for any type of competitive examinations.
2. To get best possible training for the them students through continuous training module.
3. To find themselves sound
4. To enhance problem solving skill using fast track techniques without using calculator.

**Course Content:**

| Module No. | Description | Hours | BloomsLevel | PO(1..12) Mapping |
|---|---|---|---|---|
| 1. | **Quantitative Aptitude** Simple & Compound Interest, Data Interpretation, Indices & Surds, Number System, Quadratic Equations | 6 | L1 (Remember) L2 (Understand) L4 (Analyse) | PO1,PO2, PO3,PO4 |
| 2. | **Logical Reasoning: Syllogism,** Logical Venn diagram, If Else Statement**Puzzles**Seating Arrangement, Classification, Seating Arrangement with Blood Relations**Machine Input-Output**Pattern Based I/O**Inequality** a) Coded Inequality, b) Jumbled Inequality, c) Conditional inequality. | 12 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO4 |
| 3. | **Verbal English** **Sentence Corrections,** Fill the **blanks** with appropriate words/articles/preposition/verbs/adverbs/conju nction.**Reading Comprehension** (Advance Level) **Vocabulary**. | 12 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO4 |

| | | | | |
|---|---|---|---|---|
| 4. | **Data interpretation:** Advanced Level. | 6 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO4 |

## Learning Resources:

## Reference Books:


1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Advance Maths- Rakesh Yadav
5. Verbal and Non-Verbal Reasoning- R.S Agarwal
6. A new approach to Reasoning- BS Sijwali
7. Quantitative Aptitude-R.S Agarwal


**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: ANALOG & DIGITAL COMMUNICATION**
**SUBJECT CODE: PCCEC401**

| | |
|---|---|
| **Subject Code:** PCCEC401 | **Category:** CC |
| **Subject Name**: Analog & Digital Communication | **Semester** : 4th |
| **L-T-P** : 3-0-0 | **Credit:** 3 |
| **Pre-Requisites:** Signals and Systems, Mathematics | |

## Course Objective:

1. To learn about Analog Modulation
2. To learn about Digital Modulation
3. To learn impact of Noise in communication
4. To learn about Digital Data Transmission
5. To learn about Superheterodyne Receiver

**COURSE OUTCOMES:**

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Understand the behavior of a communication system at receiver in presence of noise 3. Investigate pulsed modulation system, baseband transmission and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance, trade off issues, equalization, carrier recovery

| S.NO. | DESCRIPTION | Blooms Level | PO(1..12) MAPPING | HOURS |
|---|---|---|---|---|
| **PCC EC401 A.1** | Review of signals and systems, Frequencydomain representation of signals, Principlesof Amplitude Modulation Systems- DSB,SSB and VSB, Angle Modulation,Representation of FM and PM signals,Spectral characteristics of angle modulatedsignals | L2 (Understand) L3 (Apply) L4 (Analyse) | PO1, PO2, PO3, PO5, PO7, PO12 | 6 |
| **PCC EC401 A.2** | Super heterodyne receivers: Superheterodyning principle, Intermediatefrequency, Local oscillator frequency, Imagefrequency | L2 (Understand) L3 (Apply) L4 (Analyse) | PO1, PO2, PO3, PO5, PO7, PO12 | 6 |
| **PCC EC401 A.3** | Review of probability and random process.Gaussian and white noise characteristics,Noise in amplitude modulation systems,Noise in Frequency modulation systems. Pre emphasis and De-emphasis, Threshold effectin angle modulation | L2 (Understand) | PO1, PO2, PO3, PO5, PO7, PO12 | 6 |
| **PCC EC401 A.4** | Pulse modulation, Sampling process, PulseAmplitude and Pulse code modulation(PCM), Differential pulse code modulation,Delta modulation, Noise considerations inPCM, Time Division multiplexing, DigitalMultiplexers | L2 (Understand) L3 (Apply) L4 (Analyse) ) | PO1, PO2, PO3, PO5, PO7, PO12 | 8 |
| **PCC EC401** | Elements of Detection Theory, Optimumdetection of signals in noise, Coherent | L2 (Understand) | PO1, PO2, PO3, PO5, | 8 |

| | | | | |
|---|---|---|---|---|
| **A.5** | communication with waveforms- Probabilityof Error evaluations, Baseband PulseTransmission- Inter symbol Interference andNyquist criterion, Pass band DigitalModulation schemes- Phase Shift Keying,Frequency Shift Keying, QuadratureAmplitude Modulation, Continuous PhaseModulation and Minimum Shift Keying | L3 (Apply) L4 (Analyse) | PO7, PO12 | |
| **PCC EC401 A.6** | Digital Modulation tradeoffs, Optimumdemodulation of digital signals over band limited channels- Maximum likelihoodsequence detection (Viterbi receiver),Equalization Techniques, Synchronizationand Carrier Recovery for Digital modulation | L2 (Understand) L3 (Apply) | PO1, PO2, PO3, PO5, PO7, PO12 | 6 |

**Learning Resources:**

Modern Digital and Analog Communication Systems: B.P. Lathi, Zhi Ding, Hari M Gupta, 4th Edition Oxford University Press.

Principles of Communication Systems: Taub and Schilling, 2nd ed., Mc-Graw Hill

Haykin S., "Communications Systems", John Wiley and Sons, 2001

Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**PROPOSED SYLLABUS**
**SUBJECT NAME ANALOG ELECTRONIC CIRCUITS**
**SUBJECT CODE: PCCEC402**

| | |
|---|---|
| **Course Code: PCC**EC402 | **Category:** Professional Core courses |
| **Course Title:** Analog Electronic Circuits | **Semester :** Fourth |
| **L-T-P:** 3-0-0 | **Credit:** 3 |
| **Pre-Requisites:** Basic knowledge about components Resistors, Inductors, Capacitors; Network Theorems ( operation of semiconductor devices (Transistor, Diode etc.); Ohms Law, Voltage-current equations; Basic knowledge of Differentiation, Integration, Differential equation. | |

## Course Objective:

**1.** To understand the methods of biasing of transistors.

**2.** To design and analyse single stage and multistage amplifier circuits.

**3.** To analyse the frequency response of small signal amplifiers and design of voltage and power amplifiers using ac models of transistor.

**4.** To analyse and design active filters.

**5.** To analyse and design regulated DC power supplies.

**6.** To impart knowledge on Oscillators, feedback amplifiers and tuned amplifiers.

## Course Outcome:

After completion of this course, students will be able to:

**CO1:** Acquire knowledge on different configurations and biasing of bipolar junction transistor (BJT) and FET and their applications.

**CO2: A**cquire knowledge on analysis and design of transistor voltage and power amplifiers using their ac models.

**CO3: A**cquire knowledge on tuned amplifiers and application of feedback in amplifiers and oscillators.

**CO4: A**cquire knowledge on linear power supplies, regulators, operational amplifiers and their applications.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**PROPOSED SYLLABUS**
**SUBJECT NAME ANALOG ELECTRONIC CIRCUITS**
**SUBJECT CODE: PCCEC402**

**Course Content:**

| Module No. | Description of Topic | | | Contact Hrs. |
|---|---|---|---|---|
| 1 | **Diode Circuits:** Rectifiers, Clipper, Clamper.<br><br>**Biasing for BJT and FET**: Biasing schemes for BJT andFET amplifiers, bias stability, various configurations (such asCE/CS, CB/CG, CC/CD) and their features.<br><br>**Amplifier models:** Voltage amplifier, current amplifier,trans-conductance amplifier and trans-resistance amplifier.<br><br>**Small signal analysis:** Low frequency transistor models,estimation of voltage and current gain, input resistance, outputresistance etc. using each model, design procedure forparticular specifications, low frequency analysis of multistageamplifiers. | L2 (Understan d)<br><br>L3 | PO1, PO2, PO3, PO4, PO12 | 10 |
| 2 | **High frequency transistor models:** Functions of allparameters of high freq. model, equivalent circuit, Frequencyresponse of single stage and multi stage amplifier, RC coupledamplifier, derivation of voltage gain, current gain, inputimpedance and output impedance, frequency responsecharacteristics, lower and upper half frequencies, bandwidth,and concept of wide band-amplifier.<br><br>**Feedback Amplifiers:** Voltage series, current series,voltage shunt, current shunt, effect of feedback on gain,bandwidth etc., calculation with practical circuits, concept ofstability, gain margin and phase margin.<br><br>**Power Amplifiers:** Various classes of operation (e.g.,Class A, B, AB, C etc.), their power efficiency and linearityissues. | L3<br><br>(Apply)<br><br>L4 | PO1, PO2, PO3, PO4, PO12 | 10 |
| 3 | **Oscillators:** Review of the basic concept, Barkhausencriterion, RC oscillators (phase shift, Wien bridge etc.), LCoscillators (Hartley, Colpitts, Clapp etc.), non-sinusoidaloscillators.<br><br>**Current mirror:** Basic topology and its variants, V-Icharacteristics, output resistance and minimum sustainablevoltage ($V_{ON}$), maximum usable load. | L3<br><br>L4 | PO1, PO2, PO3, PO4, PO12 | 6 |

| | | | | |
|---|---|---|---|---|
| 4 | **Differential amplifier:** Basic structure and principle ofoperation, calculation of differential gain, common mode gain,CMRR and ICMR.<br>**Operational Amplifier:** Basic structure andcharacteristics, inverting and non- inverting amplifiers.<br>**Operational Amplifier applications:** Integrator anddifferentiator, summing amplifier, Schmitt trigger,Instrumentation Amplifier, Log & Anti-log amplifiers,Transconductance multiplier, Precision Rectifier.<br>**Active filters:** Low pass, high pass, band pass and bandstop, design guidelines. | L2 (Understan d)<br>L3 | PO1, PO2, PO3, PO4, PO12 | 8 |
| 5 | **Multivibrators:** Astable, monostable and bistable circuits,bistable circuit as memory element, generation of square,triangular waveforms and standardized pulse using Astablemultivibrator and Monostable multivibrator<br>**Linear Power Supplies:** Rectifiers and different passivefilters (e.g., Capacitor filter, LC- -section filter etc.),regulators. | L3<br>L4 | PO1, PO2, PO3, PO4, PO12 | 8 |
| Total | | | | 42 |

**Learning Resources:**

**Text books:**

1. Sedra & Smith-Microelectronic Circuits- Oxford UP.
2. Franco Design with Operational Amplifiers & Analog Integrated Circuits, 3/e, McGraw Hill.
3. Boylested & Nashelsky- Electronic Devices and Circuit Theory- Pearson/PHI.
4. Electronics fundamental D Chattopadhaya & P. C. Rakshit.
5. Linear integrated circuits-D. Roy Choudhury, Shail B. Jain.

**Reference Books:**

1. Millman & Halkias Integrated Electronics, McGraw Hill.
2. Rashid-Microelectronic Circuits-Analysis and Design- Thomson (Cenage Learning).
3. Schilling & Belove Electronic Circuit: Discrete & Integrated, 3/e, McGraw Hill. 4. Razavi- Fundamentals of Microelectronic s- Wiley.
5. Malvino Electronic Principles, 6/e, McGraw Hill.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**PROPOSED SYLLABUS**
**SUBJECT NAME ANALOG ELECTRONIC CIRCUITS**
**SUBJECT CODE: PCCEC402**


6. Horowitz & Hill- The Art of Electronics; Cambridge University Press.
7. Bell- Operational Amplifiers and Linear ICs- Oxford UP.
8. Tobey & Grame Operational Amplifier: Design and Applications, Mc GrawHill.
9. Gayakwad R.A PHI.
10. Coughlin and Driscol Operational Amplifier and Linear Integrated Circuits Pearson Education.


**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT MICROCONTROLLERS**
**SUBJECT CODE- PCCEC403**

| | |
|---|---|
| **Subject Code** : PCCEC403 | **Category** : Professional Core courses |
| **Subject Name** : Microcontrollers | **Semester** : Four |
| **L-T-P** : 3-0-0 | **Credit:3** |
| **Pre-Requisites:** Digital Electronics | |

Course Objective:

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

1. Do assembly language programming on 8085, 8086 microprocessor
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
3. Develop systems using different microcontrollers and Arduino
4. Understanding RSIC processors and ARM microcontroller based system design

Course Outcome:

COE1: To learn 8 bits, 16 bits microprocessor

COE2: To learn different peripheral devices

COE3: To learn basic microcontroller

COE4: To learn Arduino

COE5: To know about advance microprocessors

COE5: Basic concept of Arm processor

Course Content:

| Module No. | Description of Topic | Blooms Level | Contact Hrs. |
|---|---|---|---|
| 1 | L1- Overview of microcomputer systems and their building blocks --- 1H<br><br>L2- Microprocessors 8085, Memory, memory interfacing and Instruction sets of microprocessors (with programming examples) ----- 5H<br><br>L3- Concepts of interrupts and Direct Memory Access (DMA)----- 1H<br><br>L4- Microprocessors 8086 and Instruction sets of microprocessors (with programming examples) ----- 3H | L1 (Remember)<br><br>L2,L3,L4 (Under stand) | 10 |
| 2 | Interfacing with :<br>L1- Peripherals- timer---- 1H<br>L2- Serial I / O----- 1H<br>L3- Parallel I / O---- 1H<br>L4- A/D and D/A converters----- 1H<br>L5- Arithmetic coprocessors---- 1H<br>L6- System level interfacing design--- 2H<br>. | L1,L2 ,L3,L4,L5 (Under stand )<br>L6 (Apply) | 7 |
| 3 | L1- Microcontrollers 8051 systems- pin and port description, interrupts, timers---- 6H<br><br>L2- Introduction and application of Arduino with examples 4H | L1,L2<br><br>(Apply) | 10 |
| 4 | L1- Concepts of virtual memory, Cache memory---- 1H<br><br>L2- Advanced coprocessor architectures- 286, 486, Pentium---- 1H<br><br>L3- Introduction to RISC processors---- 1H<br><br>L4- ARM microcontrollers interface design-----<br><br>2H . | L1,L2,L3, L4<br><br>(Understand) | 5 |

## Learning Resources:


1. R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996
2. The 8051 Microcontroller and Embedded Systems, Md. Ali Mazadi, Pearson publication
3. Learn Arduino Prototyping in 10 days, Kallol Roy Choudhuri, Packt
4. Microprocessors and Microcontrollers, N. Senthil Kumar, OXFORD
5.D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface. Morgan Kaufman Publishers.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT ENVIRONMENTAL SCIENCE**
**SUBJECT CODE- MCEC401**

| | |
|---|---|
| **Subject Code** : MCEC401 | **Category**: Mandatory Course |
| **Subject Name** : Environmental Science | **Semester** : 4th |
| **L-T-P** : 1L:0T:0P | **Credit:** 0 |
| **Pre-Requisites:** Basic knowledge of Environmental Science | |

**Course Outcomes:**

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

| | |
|---|---|
| **CO1.** | To understand the natural environment and its relationships with human activities. |
| **CO2.** | To apply the fundamental knowledge of science and engineering to assess environmental and health risk and to acquire skills for scientific problem-solving related to air, water, noise& land pollution. |
| **CO3.** | To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations. |
| **CO4.** | To develop an idea about green chemistry for sustainable development |

**Course Content:**

| Module | Description | Hours | PO(1..12) Mapping |
|---|---|---|---|
| 1 | **Overview**<br><br>Basic ideas of environment, basic concepts, man, society & environment, their interrelationship Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development. Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step | 4 | PO1,PO2,P03,PO6,PO7 |

| | | | |
|---|---|---|---|
| | function. Importance, scope and principles of EIA.<br><br>Elements of ecology: System, open system, closed system, definition of ecology, species, population, community,definition of ecosystem components types and function.Structure and function of the following ecosystem: Food chain and Food web. Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur].Biodiversity | | |
| 2 | **Air Pollution**<br><br>Simple global temperature model [Earth as a black body, earth as albedo], Problems.<br><br>Lapse rate. Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. Definition of pollutants and contaminants, Primary and secondary pollutants: Sources and effect of different air pollutants. Smog, Photochemical smog and London smog. Depletion Ozone layer, impact of other green-house gases, effect of ozone modification. Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), | 6 | PO1,PO2,P03,PO6,PO7 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT ENVIRONMENTAL SCIENCE**
**SUBJECT CODE- MCEC401**

| | | | |
|---|---|---|---|
| 3 | **Water Pollution**<br><br>Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. DO, 5-day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river [deoxygenation, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect]. Waste water standard [BOD, COD], Water Treatment system, primary and secondary treatments, tertiary treatment definition. Water pollution due to the toxic elements. USEPA and WHO guidelines for drinking water. | 5 | PO1,PO2,P03,PO6,PO7 |
| 4 | **Green Chemistry**<br><br>Basic principles of green chemistry with examples, matrices to explain greenness, R4M4model with specific reference to econo-burette, life cycle analysis **(Cradle to-grave)** | 3 | PO1,PO2,P03,PO4,PO6,PO7 |
| 5 | **Waste Management**<br><br>Lithosphere; Internal structure of earth, rock and soil Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method Open dumping, Landfilling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste). | 3 | PO1,PO2,P03,PO6,PO7 |
| 6 | **Noise Pollution** | 3 | PO1,PO2,P03,PO6,PO7 |

| | | | | |
|---|---|---|---|---|
| | Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise,neighbourhood noise]. Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level,L10 (18hr Index) ,n Ld.Noise pollution control. | | | |
| 7 | **Environmental Management**<br><br>Emerging environmental issues and its impact on health, Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India. Different international environmental treaty/ agreement/ protocol. | 3 | PO1,PO2,P03,PO6,PO7 | |
| **Learning Resources:** | | | | |
| **T1.** | Environmental Studies, M.P. Poonia & S.C. Sharma, Khanna Publishing House | | | |
| **Reference Books:** | | | | |
| **R1.** | Introduction to Environmental Engineering and Science, Masters, G. M., Prentice-Hall of India Pvt. Ltd | | | |
| **R2.** | Environmental Chemistry, De, A. K., New Age International | | | |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**

# SUBJECT: Mathematics - IV

# SUBJECTCODE: BSC401

| | |
|---|---|
| **Subject Code :BSC401** | **Category** : Theory |
| **Subject Name** :**Mathematics - IV** | **Semester** : $4^{th}$ |
| **L-T-P:** : **3-0-0** | **Credit: 3** |
| **Pr-Requisites: BSC-103, BSC-203, BSC301** | |

**Course Objective**:

**1: Identify different tools for numerical solution of algebraic, transcendental, differential and difference equations along with interpolation and extrapolation. The constructive part of Mathematics deals with numerical differentiation and integration of functions where traditional method fails to give analytical solutions- used for solving engineering problems.**
**2: Illustrate the ideas of transform calculus to solve ordinary and partial differential equations for initial and boundary value problems and also integral equations and difference equations. These methods being totally different from the traditional methods described in calculus, they will open a new dimension in solving engineering problems.**

**3**: **Express the relationship between variables by means of some mathematical equation - representing a geometrical curve for observations in respect of two variables. Apply probability theory meaningfully in the process of decision making under state of uncertainty and risk. 4: Interpret the ideas of using *t*- distribution (instead of *z*-distribution) in testing the significance of the parameters of the population in the light of small samples drawn from the population.**

**COURSEOUTCOMES:**

**CO 1: Students will be able to deal with errors in computation, difference operators and method of separation of symbols. Also they will be able to detect the best method of solution of an engineering problem depending upon the desired accuracy level and available facilities such as hardware and software.**

**CO 2: Students will be able to solve engineering problems arising in circuit analysis, signal processing and dynamical system analysis arising in electrical/electronics/control engineering.**

**CO 3: Students will construct models for an engineering problems and the parameters in the model are determined by fitting experimental data. As fitting can not be done exactly so they will learn to apply method of least squares approach for fitting, to transform a given set of quantitative data into meaningful information to help in decision making. They will be able to study the characteristics of a whole population from which the data is obtained. They will learn to use probability theory for decision making in the context of uncertainty and risk,**

**CO 4: Students will be able to test some quantitative statement about a population when a small sample is drawn and will learn to use *t*- values instead of *z* -values for test statistic in small sample tests.**

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: Mathematics - IV**
**SUBJECTCODE: BSC401**

**Course Contents:**

| Module No. | Description of Topic | Contact Hrs. | Blooms Level |
|---|---|---|---|
| **1** | **Numerical Methods :**<br>Solution of polynomial and transcendental equations Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators,<br>backward difference formulae. Interpolation with<br>Numerical Differentiation,Numerical<br>and 3/8 th rules.<br>- Kuttamethod of fourth order for solving first and<br>predictor corrector methods. | **22** | **L2(Understa nd) L3 (Apply) L5 (Evaluate)** |
| **2** | **Transform Calculus**<br>Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions.<br>Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODE s by Laplace Transform method. Fourier transforms. | **10** | **L3 (Apply)L4(A nal yze)L5 (Evaluate)** |
| **3** | **Applied Statistics**<br>Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. | **8** | **L3(Apply)L4 (A nalyze) L5 (Evaluate)** |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: Mathematics - IV**
**SUBJECTCODE: BSC401**

| | | | |
|---|---|---|---|
| **4** | **Small samples**<br><br>Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes. | **4** | **L2(Understand)**<br><br>**L3(Apply)**<br>**L4(Analyze)** |

**Books Recommended:**

(i) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(ii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.

(iii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

(iv) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).

(v) S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002. (vi) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. (vii)Lipschutz S., and Lipson M.L.: Probability (Schaum's Outline Series), TMH. (viii) C.Xavier: C Language and Numerical Methods.

(ix)J.B.Scarborough: Numerical Mathematical Analysis.

(x) John E. Freund, Ronald E. Walpole, Mathematical Statistics, Prentice Hall

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT ESSENTIAL STUDIES FOR PROFESSIONALS - IV**
**SUBJECT CODE- HSMC402**

| | |
|---|---|
| **Subject Code** : HSMC402 | **Category** : GSC |
| **Subject Name** : ESP-IV | **Semester** : 4th |
| **L-T-P** : 2-0-0 (Total Contact Hrs. 2) | **Credit:** 2 |
| **Pre-Requisites:** Basic Social Science, NCERTs | |

**Course Objective**:

1. To learn about basic of History to know about our past and to implement it in our daily life.
2. To learn about the Political System of Our Country.
3. To learn the concepts of Basics of Geography and Economics from which Students will acquire knowledge for Competitive exams.

**Course Outcomes:**

At the end of the course the students will be able

1. To inculcate human values and ethical thinking among students.
2. To prepare the stage for facing different levels of civil service and other competitive examinations.
3. To prepare the ground for making them aware of the happenings, cultural historical and developmental aspects of the country as well as global affairs
4. Learning current affairs with technique.

**Course Content:**

| Module No. | Description | Hours | Blooms Level | PO(1..12) Mapping |
|---|---|---|---|---|
| 1. | **Indian Geography at a glance (Physical, Regional & Economic)** | 6 | L1 (Remember) L2 (Understand) L4 (Analyse) | PO1,PO2, PO3,PO12 |

2. **History** Modern History& National Movement. 12 L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) PO1,PO2, PO3,PO12

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT ESSENTIAL STUDIES FOR PROFESSIONALS - IV**
**SUBJECT CODE- HSMC402**

| | | | | |
|---|---|---|---|---|
| 3. | **Constitution of India** Central- Executive & Legislative, State Executive & Legislative | 6 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO12 |
| 4. | | 12 | L1 (Remember) L2 (Understand) L3 (Apply) L4 (Analyze) | PO1,PO2, PO3,PO12 |

**Learning Resources:**

**Text Books:**

1. NCERT Books from class 8-12.

**Reference Books:**

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: PYTHON PROGRAMMING (MOOCS 3)**
**SUBJECT CODE: MOOCs(ECE)421**

| | |
|---|---|
| **Subject Code** : MOOCs(ECE)421 | **Category** : Engineering Sciences |
| **Subject Name** : Python Programming | **Semester** : 4th |
| **L-T-P** : **2-0-0** | **Credit: 2** |
| **Pre-Requisites:** Basic knowledge of Programming | |

## Course Objective:

1. Describe the core syntax and semantics of Python programming language.
2. Discover the need for working with the strings and functions.
3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system and infer the Object-oriented Programming concepts in Python.

## Course Contents:

| Module No. | Description of Topic | Contact Hrs. |
|---|---|---|
| 1 | **Introduction, Types, Operator & Control Statements**<br>History, Features, Setting up path, Working with Python, Basic Syntax, Variable, Data and Operators, Conditional Statements: If, If-else, Nested if-else, Looping, For, While, Nested loops, Control Statements: Break, Continue, Pass. | 10 |
| 2 | **String Manipulation & Handling Functions**<br>Accessing Strings, Basic Operations, String slices, Function and Methods, Defining & calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables. | 10 |
| 3 | **Collection Data Types**<br>Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods,<br>Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods<br>Dictionaries: Introduction, Accessing values in dictionaries, working with dictionaries and its properties<br>Set: Set Methods, Traversing of Sets, Frozenset. | 10 |

| | | |
|---|---|---|
| 4 | **Modules & Exception Handling**<br>Importing module, Math module, Random module, Packages, Composition, Input-Output, Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, | 6 |
| | Functions, Exception, Exception Handling, Except clause, Try? Finally clause, User Defined Exceptions. | |

## Books Recommended:


1. Gowrishankar S, Veena A, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372.
2. Jake VanderPlas, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058.
3. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 1st Edition 2011.
4. Computing for beginners, Shroff Publisher-X team Publisher.
5. Limited, 2017.
6. Tom Mitchell, Machine Learning, McGraw Hill, 2017.
7. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2011.
8. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e,2011.


## Course Outcomes:

| Sl. No. | Description | Blooms Level |
|---|---|---|
| | Upon completion of the course, the students will be able to: | |
| **MOOCs(ECE)421.1** | Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements and handling operators. | Understand (L2) |
| **MOOCs(ECE)421.2** | Express proficiency in the handling of strings and functions. | Understand (L2) |
| **MOOCs(ECE)421.3** | Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. | Apply (L3) |
| **MOOCs(ECE)421.4** | Identify the commonly used operations involving file systems & modules and articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python. | Understand (L2) |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT- ANALOG AND DIGITAL COMMUNICATION LAB**
**SUBJECT CODE- PCCEC491**

| | |
|---|---|
| **Subject Code:** PCCEC491 | **Category** : Program Core Courses |
| **Subject Name:** Analog and Digital Communication Lab | **Semester** : Fourth |
| **L-T-P** : 0-0-2 | **Credit:** 1 |
| **Pre-Requisites:** Signals and system, Fundamental of MATLAB, Basic electronics | |

## Course Objective:

**COE1:** To help students to perform Analog and Digital Communication experiments assigning design problems

**COE2:** To help students realize simulation results at the end of each experiment

## Proposed Syllabus:

| Module No. | Description | Lecture Hours |
|---|---|---|
| 1 | Measurement of Modulation Index of an Amplitude Modulated (AM) Signal | 2 |
| 2 | Study of Modulation and Demodulation of Double Side Band Suppressed Carrier (DSB-SC) | 2 |
| 3 | Study of Modulation and Demodulation of Single Side Band Suppressed Carrier (SSB-SC) | 2. |
| 4 | Study of Modulation and Demodulation of Frequency Modulation (FM) | 2 |
| 5 | Measurement of SNR of an audio signal | 2 |

| | | |
|---|---|---|
| 6 | Study and Design of Phase Locked Loop (PLL) | 2 |

| | | |
|---|---|---|
| 7 | Study of Modulation and Demodulation of Pulse Amplitude Modulation (PAM) | 2 |
| 8 | Study of Modulation and Demodulation of Pulse Code Modulation (PCM) | 2 |
| 9 | Study of Modulation and Demodulation of Delta Modulation (DM) | 2 |
| 10 | Study of Modulation and Demodulation of Adaptive Delta Modulation (ADM) | 2 |
| 11 | Study of Modulation and Demodulation of Phase Shift Keying (PSK) | 2 |
| 12 | Study of Modulation and Demodulation of Frequency Shift Keying (FSK) | 2 |
| 13 | Study of Modulation and Demodulation of Amplitude Shift Keying (ASK) | 2 |

## Course Outcome:

**CO1**: Students will be able to demonstrate the ability to solve practical engineering problems

**CO2**: Students can realize about simulation outputs for different experiments (Preferably MATLAB)

**CO3**: Students can be able to analyze and interpret data obtained from different experiments

## Learning Resources:

1. Laboratory manual (workbook)
2. www.mathworks.com
3. www.octave-online.net

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**PROPOSED SYLLABUS**
**SUB ANALOG ELECTRONIC CIRCUITS LABORATORY**
**CODE: PCC-EC492**

| | |
|---|---|
| **Subject Code** : PCC-EC492 | **Category** : Professional Core courses |
| **Subject Name** : Analog Electronic Circuits Laboratory | **Semester** : Fourth |
| **L-T-P** : 0-0-2 | **Credit:1** |
| **Pre-Requisites:** Basic electronics, Analog electronics | |

**Course Objective:**

1. To get practical experience with different electronic components.
2. To get practical experience of designing analog circuits using electronic devices.
3. To develop hands on experience with modern technology so that students can work as professionals in the area of Analog electronics and other Engineering fields.
4. To learn different tools to simulate different analog circuits.

**Course Outcomes:**

**CO1:** Students different applications of diode.

**CO 3:** They will be able to design power amplifier and multi vibrator circuit.

**CO 4:**
Circuits using OP-AMP.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**PROPOSED SYLLABUS**
**SUB ANALOG ELECTRONIC CIRCUITS LABORATORY**
**CODE: PCC-EC492**

**Course Content:**

| Module No. | Description of Topic | Blooms Level | PO (1..12) MAPPING | Contact Hrs. |
|---|---|---|---|---|
| 1(CO1) | Design of different types of Rectifier circuits andcalculate Vrms and Vdc. | L2,L3,L4 | | 2 |
| 1(CO1) | Design of positive and negative biased clipper circuit. | L2,L3,L4 | | **2** |
| 1(CO1) | Design of positive and negative biased clamper circuit. | L2,L3,L4 | | **2** |
| 2(CO2) | Design of series and shunt regulator circuit using Zenerdiode. | L2,L3,L4 | | **2** |
| **2(CO2)** | | L2,L3,L4 | | **2** |
| **2(CO2)** | | L2,L3,L4 | | **2** |
| **3**(CO2) | Design and set up the BJT common emitter voltageamplifier with and without feedback and determine thefrequency response, gain- bandwidth product, input andoutput impedances. | L2,L3, L4 | | **2** |
| 3(CO2) | Design and setup the Common Source JFET/MOSFET amplifier and plot the frequency response. | L2,L3,L4 | | **2** |
| 4(CO3) | Design Monostable and astable Multivibrator using 555 Timer. | L2,L3,L4 | | **2** |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**PROPOSED SYLLABUS**
**SUB ANALOG ELECTRONIC CIRCUITS LABORATORY**
**CODE: PCC-EC492**

| | | | | |
|---|---|---|---|---|
| 4(CO3) | Design of Oscillator circuits. | L2,L3,L4 | | **2** |
| 5(CO4) | Design of Adder, Integrator and Differentiator circuits usingOp-Amp. | L2,L3,L4 | | **2** |
| 5(CO4) | Design and study of power amplifier. | L2,L3,L4 | | **2** |
| 6 | Project | L5 | | **4** |
| **Total Hours:** | | | | **28** |

**Learning Resources:**


1. Sedra & Smith-Microelectronic Circuits- Oxford UP.
2. Franco Design with Operational Amplifiers & Analog Integrated Circuits, 3/e, McGraw Hill.
3. Boylested & Nashelsky- Electronic Devices and Circuit Theory- Pearson/PHI.
4. Electronics fundamental D Chattopadhaya & P. C. Rakshit.
5. Linear integrated circuits-D. Roy Choudhury, Shail B. Jain.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: MICROCONTROLLER LAB**
**SUBJECT CODE: PCCEC493**

| | |
|---|---|
| **Subject Code** : PCCEC493 | **Category**: Professional Core course |
| **Subject Name** : Microcontrollers Lab | **Semester** : 4th |
| **L-T-P** : **0-0-2 (Total Contact Hrs. 2)** | **Credit:**1 |
| **Pre-Requisites:** | |

**Course Objective**:

1. To introduce the basic concepts of microprocessor and to develop in students the assembly language programming skills and real time applications of Microprocessor as well as microcontroller .
2. To Study the Architecture of 8051 microcontroller.

| Module No. | Description of Topic | Contact Hrs. | Blooms Level |
|---|---|---|---|
| 1. | Introduction to 8085 microprocessor architecture.<br>Comparison between microprocessor and microcontroller.<br>Students are introduced with the operation of microprocessor (8085) trainer kit and simulator 8085. | 2 | L2 (Understand) |
| 2. | Study of basic instruction set used in 8085 microprocessor program (data tranfer,Load/store,Arithmetic,logical). | 2 | L2 (Understand)<br>L3 (Apply) |
| 3. | Study of 8085 microprocessor program (16- bit) for interchanging the nibbles, assemble,<br><br>compliment, multiplication, maximum, minimum. | 2 | L2(Understand)<br>L3 (Apply) |
| 4. | Study of 8085 program using LOOK UP TABLE,PUSH POP instruction. | 2 | L2 (Understand)<br>L3 (Apply) |
| 5. | Study of 8085 program for addition and substraction of BCD numbers. | 2 | L2 (Understand)<br>L3 (Apply) |
| 6. | Study of 8085 program for sorting of array in ascending and descending order, divition of 8- | 2 | L2 (Understand)<br>L3 (Apply) |

| | | | |
|---|---|---|---|
| | bit nos,BCD multiplication,SUBROUTINE CALL, | | |
| 7. | Study of 8051 microcontroller IC and writing programs. | 2 | L2 (Understand) L3 (Apply) |

**Course Outcomes:**

CO1: Student will be able to compare micro-processors (8085) and microcontroller

(8051). CO2: Student will be able to explain the architecture of microprocessor.

CO3: Student will be able to write program of different problems.

CO4: Student will be able to design real time apllications using micro-controllers.

**Learning Resources :**


1. Microprocessor architecture, programming and application with 8085 R. Gaonkar (Penram International) (strongly recommended)

2. Microprocessors & interfacing D. V. Hall (Tata McGraw-hill)

3. Ray & Bhurchandi, Advanced Microprocessors & Peripherals, TMH

4. The 8051 microcontroller and Embedded systems - Mazidi, Mazidi and McKinley (PEARSON)

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT- OBJECT ORIENTED PROGRAMMING**
**SUBJECT CODE- OECEC481**

| | |
|---|---|
| **Subject Code**: OECEC481 | **Category**: Sessional Paper |
| **Subject Name**: Object Oriented Programming | **Semester** : 4th |
| **L-T-P** : 1-0-2 | **Credit:** 2 |
| **Pre-Requisites:** Introduction of C language, Basics of programming language. | |

## COURSE OBJECTIVES:

To learn object oriented programming paradigms and various object oriented modeling.

To learn basic concepts, structure syntax of C++.

To learn & implement various programming problems in C++.

To learn & implement advanced programming concepts in C++

To learn error handling technique in C++ and improve problem solving ability.

## Course Contents:

| Module No. | Description | Lecture Hours |
|---|---|---|
| 1 | **Introduction:**<br><br>Programming paradigms, Language translator, Basics of OOP, Structure of C++ program, Class and object, Abstraction and encapsulation, Polymorphism, Inheritance, Static and dynamic binding. | 2 |
| 2 | **Declaration, Expression and statements:**<br><br>Data types, Variables, Constants, Operator and expression, Operator precedence and associativity. Statements: Labelled, Expression, Compound, Control, Jump, Declaration, Try throw-catch.<br><br>**Array, pointer and function**:<br><br>Array, Addresses, Pointer. Function: Declaration, Definition and call, Inline function, Main function argument, Reference variable, Function overloading, Default argument, Parameter passing, Recursion, Scope of variable, Return-by-value and Return-by-reference, Pointer to function | 4 |
| 3 | **Data abstraction through classes and user defined data types**:<br><br>Class, Members, Constructor and destructor, Copy constructor. Dynamic memory management: Operators new and delete, Malloc and free, Static member, Scope of class names, Scope of variables. | 3 |

| | | |
|---|---|---|
| 4 | **Operator Overloading**:<br><br>Overloading unary and binary operator, Overloaded function calls, Subscripting, class member access, Non-member operator, New and delete, Cast operator. | 3 |
| 5 | **Class relationships**:<br><br>Introduction, Polymorphism, Coercion, Overloading, Parametric and inclusion polymorphismInheritance: direct and indirect superclasses, Multiple inheritance, Virtual base class,Friend,Virtual function, Abstract class, Overriding and hiding, Dynamic binding of functions, Virtualdestructor and operators. | 3 |
| 6 | **Template and Exception Handling**:<br><br>Class template, Member function inclusion, Function template, Specialization, Inheritance,Namespace. Concept of exception handling, Catch block, Nested try-catch block, Conditionexpression in throw expression, Constructor & destructor, Runtime standard exception. | 3 |
| 7 | **Standard Library in C++**:<br>Standard library function, Input and output, Iostream class hierarchy, Class ios, Other stream classes.<br>**Object oriented design and modeling**:<br>Software development, Qualities of software system, Software architecture, Process life cycle, phases, Modularity, OO methodology, Modeling, UML overview, Object oriented design patterns. | 3 |
| Total | | 21 |

## Course Outcome:

*After completion of this course, the learners will be able to*

| COURSE OUTCOME (CO) | DESCRIPTION | Blooms Level |
|---|---|---|
| **OECEC481.1** | Know basic knowledge of object oriented modeling and its application in computer science. | L1, L3 Remember and Apply |
| **OECEC481.2** | Understand basic concepts & structure of object oriented programming language using C++ | L2 Understand |
| **OECEC481.3** | Design and develop various programming problems using basic concepts of C++ | L3 Apply |
| **OECEC481.4** | Learn and implement advance programming concepts of C++ like Inheritance, operator overloading, etc | L2 Understand |
| **OECEC481.5** | Learn and implement exception handling mechanism for debugging in C++ | L1, L2 Remember and Apply |

## Learning Resources:

*Advanced OOPs using C++:*


1. Schildt, H., The Complete Reference C++, McGraw Hill.
2. C++ object oriented programming paradigm, Debasish Jana, PHI
3. Pooley, R and P. Stevens, Using UML , Addison-Wesley.
4. Programming In C++, Y.I. Shah and M.H. Thaker, ISTE/EXCEL BOOKS


## INSTITUTE OF ENGINEERING & MANAGEMENT
## (AUTONOMOUS INSTITUTION)
## SUBJECT SKILL DEVELOPMENT FOR PROFESSIONALS - IV
## SUBJECT CODE: HSMC482

| | |
|---|---|
| **Subject Code** : HSMC482 | **Category**: GSC |
| **Subject Name** : Skill Development for Professionals - IV | **Semester** : 4th |
| **L-T-P** : 2-0-0 (Total Contact Hrs. 2) | **Credit:** 1 |
| **Pre-Requisites:** Basic Mathematics, General English. | |

**Course Objective**:
1. To enhance the aptitude & analytical skill of students with multiple tricky approaches.
2. To prepare the students for various competitive examinations & professional exams

**Course Outcomes:**

At the end of the course the students will be able

1. To enhance their problem solving skills, to improve the basic mathematical & Logical Skills for any type of competitive examinations.
2. To get best possible training for the them students through continuous training module.
3. To find themselves sound for th
4. To enhance problem solving skill using fast track techniques without using calculator. **Course Content:**

| Module No. | Description | Hours | Blooms Level |
|---|---|---|---|
| 1. | **Quantitative Aptitude** Permutation & Combination, Probability,Geometry, Mensuration | 6 | L1 (Remember) L2 (Understand) L4 (Analyse) |

| | | | |
|---|---|---|---|
| | 2. **Logical Reasoning**<br>**1) Seating Arrangement**<br>a) Circular seating arrangement<br>b) Square seating Arrangement<br>c) Line Arrangement | **2) Calendar And Clock**<br>**3) Miscellaneous Problems**<br>12 L1 (Remember) L2 (Understand)<br>L3 (Apply)<br>L4 (Analyze) | |
| 3. | **1) Sentence Corrections**<br>**2)** Fill the **blanks** with appropriatewords/articles/preposition/verbs/adverbs/conjunction**.**<br>**3) Reading Comprehension** (AdvanceLevel)<br>**4) Vocabulary** | 12 | L1 (Remember)<br>L2 (Understand)<br>L3 (Apply)<br>L4 (Analyze) |

**Learning Resources:**

**Reference Books:**

7.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: ELECTROMAGNETIC WAVES**
**SUBJECT CODE: PCCEC501**

| | |
|---|---|
| **Subject Code: PCCEC501** | **Category:** CC |
| **Subject Name**: **Electromagnetic Waves** | **Semester** : 5th |
| **L-T-P** : 3-0-0 (Total Contact Hrs.3) | **Credit:** 3 |
| **Pre-Requisites:** Mathematics, Physics, Signals and Systems | |

## Course Objective:

1. To understand basics of electromagnetism and to learn the formation of plane wave and be able to apply this knowledge in different applications.
2. To introduce the student to build concept of electromagnetic waves, transmission lines, waveguides and their practical applications.
3. To enrich strong foundation on systems in modern communication.
4. To develop a strong understanding on antennas.

**COURSEOUT COMES:**

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

1. Acquire knowledge on Electromagnetic Theory & Transmission Line with respective application and implementation.
2. Understand the importance of electromagnetic waves with corresponding mathematical modeling.
3. Understand the physical and practical importance of transmission lines.
4. Understand basic concepts of waveguides.
5. Acquire knowledge about different antennas with corresponding physical and practical significances.

| S.NO. | DESCRIPTION | BLOOMS LEVEL | HOURS |
|---|---|---|---|
| | Students will be able to: | | |
| **PCCEC501.1** | **Electromagnetics:** Vector calculus - orthogonal Coordinate System, Transformations of coordinate systems, Basic quantities of Electromagnetics, **Basic laws ofElectromagnetics:** Electromagnetic induction. Vector magnetic charge and surface current, Boundary conditions at media interface. | L2 (Understand) L4 (Analyse) | 8 |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: ELECTROMAGNETIC WAVES**
**SUBJECT CODE: PCCEC501**

| | | | |
|---|---|---|---|
| **PCCE C501.2** | **Uniform plane wave:** homogeneous unbound medium, Wave equation for time harmonicfields, Solution of the wave equation, Uniform plane wave, Wave polarization, Wavepropagation in conducting medium, Phase velocity of a wave, Power flow and Poynting vector, Skin Depth.<br><br>**Plane Waves at Media Interface:** Planewave in arbitrary direction, Plane wave at dielectric interface, Reflection and refraction of waves at dielectric interface, Total internal reflection. | L2 (Understand) L4 (Analyze) | 12 |
| **PCCE C501.3** | **Transmission Lines:** Introduction, Conceptof distributed elements, Equations of voltage and current, Standing waves and impedance transformation, Lossless and low-losstransmission lines, Power transfer on a transmission line, Analysis of transmission line in terms of admittances, Transmission line calculations with the help of Smith chart, Applications of transmission line, Impedance matching using transmission lines. | L3 (Apply) L4 (Analyze) | 8 |
| **PCCE C501.4** | **Waveguides:** Introduction of waveguide, Rectangular waveguides: Analysis of waveguide-general approach, Waveguide modes, Cut-off frequency, And Phasevelocity. | L3 (Apply) L4 (Analyze) | 6 |
| **PCCE C501.5** | **Antennas:** Radiation parameters of antenna, Introduction of Hertz dipole, Total powerradiated by a dipole, Radiation resistance and radiation pattern of Hertz dipole. | L2 (Understand) L3 (Apply) | 6 |

**Learning Resources:**

**Text Books:**

1. Sadiku & Kulkarni, Principles of Electromagnetics, 6e, Asian edition, Copyright © 2015 by Oxford University Press

2.
3. Reference Books:
4. Electromagnetic Waves and Radiating Systems - E.C. Jordan and K. G. Balmain, PHI. 5.
D. K. - Wesley, 1989.
6. Engineering

Electromagnetics, 7th Edition-W.H.Hayt & J. A. Buck, Tata-McGraw-Hill. 7.

8.

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: Digital Signal Processing**
**SUBJECT CODE: PCCEC502**

| | |
|---|---|
| **Subject Code : PCCEC502** | **Category** : Professional Core courses |
| **Subject Name** : **Digital Signal Processing** | **Semester** : 5th |
| **L-T-P** : 3-0-0 (Total Contact Hrs. 3) | **Credit:** 3 |
| **Pre-Requisites:** Mathematics: Sequence and series, algebra of complex numbers, basic trigonometry. Calculus: Differential and Integral calculus (single variable). Knowledge of differential equations is helpful but not required. | |

## Course Objective:

**COE1:** Represent signals mathematically in continuous and discrete-time, and in the frequency domain.

**COE2:** Analyze discrete-time systems using z-transform.

**COE3:** Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms.

**COE4:** Design digital filters for various applications. Apply digital signal processing for the analysis of real-life signals.

## Course Contents:

| Module No. | Description of Topic | Contact Hrs. |
|---|---|---|
| 1 | Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals - aliasing; Sampling theorem and Nyquist rate. | 10 |
| 2 | z-Transform, Region of Convergence, Analysis of Linear Shift Invariant systems using z- transform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z transforms. | 8 |
| 3 | Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Connvolution of signals, Fast Fourier Transform Algorithm, Identity, Implementation of Discrete Time Systems. | 12 |
| 4 | Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low-pass, Band-pass, Band- stop and High-pass filters. Effect of finite register length in FIR filter design. Parametric and non parametric spectral estimation. Introduction to multi-rate signal processing. Correlation Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter. | 10 |

## Books Recommended:


1. S. K. Mitra, Digital Signal Processing: A computer based McGraw Hill, 2011.
2. A.V. Oppenheim and R. W. Schafer, Time Signal Prentice Hall, 1989.
3. J. G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Prentice Hall, 1997.
4. L. R. 1992.


**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: Digital Signal Processing**
**SUBJECT CODE: PCCEC502**


5. J. R. Johnson, Introduction to Digital Signal Prentice Hall, 1992.
6. D. J. DeFatta, J. G. Lucas andW. S. Hodgkiss, Digital Signal , John Wiley & Sons, 1988.


## Course Outcomes:

| S.NO. | DESCRIPTION | Blooms Level |
|---|---|---|
| | Students will be able to: | |
| **PCCEC 502A.1** | Ability to Infer the different types of CT and DT signals from their mathematical / graphical representations and classify them into various categories. Ability to characterize random signals using their statistical properties | L1, L3 Remember and Apply |
| **PCCEC 502A.2** | Ability to analyze the CT and DT signals in time domain and frequency domain to infer their characteristics. Ability to apply the acquired knowledge to classify CT and DT systems into various categories | L2 Understand |
| **PCCEC 502A.3** | Ability to determine the response of a system for a given input using time domain and frequency domain techniques | L3 Apply |
| **PCCEC 502A.4** | Ability to select the appropriate transform technique for the analysis of a given CT or DT system | L2 Understand |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: COMPUTER ARCHITECTURE**
**SUBJECT CODE: PECEC503**

| | |
|---|---|
| **Subject Code** : PECEC503 | **Category**: Engineering Sciences |
| **Subject Name** : Computer Architecture | **Semester** : 5th |
| **L-T-P** : **3-0-0** | **Credit: 3** |
| **Pre-Requisites:** Digital System Design, Microprocessors and Microcontrollers | |

## Course Objective:

1. To learn how computer systems work & the basic principles.
2. To learn instruction level architecture and instruction execution.
3. To acquire knowledge the current state of art in memory system design.
4. To learn how I/O devices are accessed and its principles.
5. To impart the knowledge on micro programming.
7. To learn the principles of pipelining techniques, hazards, super-pipelines, interconnection networks.

## Course Contents:

| Module No. | Description of Topic | Contact Hours |
|---|---|---|
| 1 | **Basic structure of computers:** Computer organization and architecture overview, Basic functional units hardware and software stack interfaces, Harvard and Von Neumann architecture, Performance issues in systems software, Machine instructions and applications programs, Types of instructions, and Instruction sets: Instruction formats, Assembly language, Stacks, Queues, Subroutines. | 6 |
| 2 | **Processor organization:** Information representation, number formats. 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. Micro-programmed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Micro programmed computers - CPU control unit. CISC vs RISC CPU architecture | 10 |
| 3 | **Memory organization:** Memory system overview, Hierarchical memory technology, Device characteristics, RAM, ROM, Memory management, Concept of cache & associative memories, Virtual memory organization. | 8 |
| 4 | **Input output systems and parallel processing:** Standard I/O interfaces, Programmed I/O, Interrupt-driven I/O, DMA | 12 |

| | | |
|---|---|---|
| | Pipelining, pipeline hazards (data, control and structural hazards), techniques for handling hazards, lassification of computer architectures, overview of VLIW and superscalar processors, SIMD and vector processors, array processing, GPU Architecture, Symmetric multiprocessors (SMP), NUMA-MPs, Massively parallel processors (MPPs), interconnection networks, multiprocessing, multiplexing, multithreading | |

## Books Recommended:


**1.** th Ed., Pearson.
**2.** 6th Ed., Pearson.
**3.** th Ed., McGraw Hil India.
**4.** M. Morris Revised 3rd Ed., Pearson. **5.** er Organization and Design: The
**6.** John L. Hennessy, David A. Patterson , 5th Ed., Morgan Kaufmann/Elsevier-India.
**7.** , McGraw Hill Education; 3rd edition.
**8.** Kai Hwang d Computer Architecture: Parallelism, Scalability, .


## Course Outcomes:

| Sl. No. | Description | Blooms Level |
|---|---|---|
| | Upon completion of the course, the students will be able to: | |
| **PCCEC503.1** | **Understand** basic structure of digital computer, concept of instruction sets and principles of working. | Understand (L2) |
| **PCCEC503.2** | **Explain** numerous instruction formats, the various arithmetic operations for computers and concepts of micro-programmed control. | Understand (L2) |
| **PCCEC503.3** | **Identify** the fundamentals of memory system. | Understand (L2) |
| **PCCEC503.4** | **Describe** the concepts of I/O system and describe the concepts of parallel processing architecture and interconnection network. | Understand (L2) |

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: INFORMATION THEORY&CODING**

**SUBJECT CODE: PECEC504A**

| | |
|---|---|
| **Subject Code : PECEC504A** | **Category:** Program Elective-1 |
| **Subject Name** : **Information Theory & Coding** | **Semester** : 5th |
| **L-T-P** : 3-0-0 (Total Contact Hrs. 3) | **Credit:** 3 |
| **Pre-Requisites:** Mathematics, Communication Engineering | |

## Course Objective:

1. To introduce the basic concepts of information theory.
2. To give the idea of various coding theory and the importance of all in the information systems in communication engineering.
3. To understand the theoretical background for the implementation of error- control codes.

## Course Contents:

| Module No. | Description of Topic | Contact Hrs. |
|---|---|---|
| 1 | **Information Theory:** Basics of information theory Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon Fano coding, Huffman coding, Extended Huffman coding, uniquely detectable codes, Joint and conditional entropies, Mutual information Discrete memoryless channels BSC, BEC Channel capacity, Shannon limit. | 8 |
| 2 | **Error Control Coding: Block Codes** Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding Single parity codes, Hamming codes, Repetition codes Linear block codes, Cyclic codes Syndrome calculation, Encoder and decoder CRC Techniques of coding and decoding of Cyclic codes. | 8 |
| 3 | **Error Control Coding: Convolutional Codes** Convolutional codes code tree, trellis, state diagram Encoding Decoding: Sequential search and Viterbi algorithm Principle of Turbo coding | 10 |
| 4 | **BCH codes** Algebraic Description, Frequency Domain Description, Decoding Algorithms for BCH and RS Codes. | 6 |

## Books Recommended:

1. R. J. McEliece, The Theory of Information and Coding, Cambridge University Press 2. R. Bose, Information Theory Coding and Cryptography, Tata McGraw Hill
3. M. Cover, J. A. Thomas, Elements of Information Theory, Wiley
4. R. Togneri, C.J.S deSilva, Fundamentals of Information Theory and Coding Design, Taylor and Francis

**INSTITUTE OF ENGINEERING & MANAGEMENT**
**(AUTONOMOUS INSTITUTION)**
**SUBJECT: INFORMATION THEORY&CODING**
**SUBJECT CODE: PECEC504A**

## Course Outcomes:

| S.NO. | DESCRIPTION | Blooms Level |
|---|---|---|
| | Students will be able to: | |
| **ECELE C504A**.1 | **Define and Calculate** information, entropy, mutual information and channel capacity for various channels. | L1, L3 Remember and Apply |
| **ECELE C504A**.2 | **Understand**various source coding and various channel coding techniques. | L2 Understand |
| **ECELE C504A**.3 | **Implement** various error control techniques for Convolutional codes. | L3 Apply |
| **ECELE C504A**.4 | **Describe** decoding algorithms for BCH and RS Codes. | L2 Understand |