## II Year-I Semester

| S. No. | Subject Code | Subject | SC | L | T | P | IM | EM | CR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14212101 | Mathematics-3 | BS | 3 | 1 | 0 | 30 | 70 | 3 |
| 2 | 14012102 | Environmental Studies | HS | 3 | 0 | 0 | 30 | 70 | 3 |
| 3 | 14022103 | Electrical Circuits & Networks | PN | 4 | 0 | 0 | 30 | 70 | 3 |
| 4 | 14042104 | Electronic Devices and Circuits | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 5 | 14042105 | Signals and Systems | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 6 | 14042106 | Switching Theory and Logic Design | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 7 | 14042107 | Basic Simulation Lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |
| 8 | 14042108 | Electronic Devices & Circuits Lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |
| | | | | | | | | | |
| Total: | | | | | | | 280 | 520 | 22 |

## II Year-II Semester

| S. No. | Subject Code | Subject | SC | L | T | P | IM | EM | CR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14252201 | Managerial Economics & Financial Analysis | HS | 4 | 0 | 0 | 30 | 70 | 3 |
| 2 | 14022202 | Principles of Electrical Engineering | PN | 4 | 0 | 0 | 30 | 70 | 3 |
| 3 | 14042203 | Electronic Circuit Analysis | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 4 | 14042204 | Pulse and Digital Circuits | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 5 | 14042205 | Electromagnetic Theory & Transmission Lines | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 6 | 14042206 | Probability Theory & Stochastic Processes | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 7 | 14042207 | Electronic Circuit Analysis Lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 8 | 14122208 | Electrical Engineering Lab | PN | 0 | 0 | 3 | 50 | 50 | 2 |
| Total: | | | | | | | 280 | 520 | 22 |
| | | | | | | | | | |

## III Year-I Semester

| S. No. | Subject Code | Subject | SC | L | T | P | IM | EM | CR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14043101 | Analog Communications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 2 | 14043102 | Linear IC Applications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 3 | 14023103 | Control Systems | PN | 4 | 0 | 0 | 30 | 70 | 3 |
| 4 | 14043104 | Antenna and wave propagation | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 5 | 14053112 | Computer Organization | PN | 4 | 0 | 0 | 30 | 70 | 3 |
| 6 | 14043106 | Digital IC Applications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 7 | 14213107 | Advanced English Language Communication skills lab | HS | 0 | 0 | 3 | 50 | 50 | 2 |
| 8 | 14043108 | Pulse & Digital Circuits Lab | PJ | 4 | 0 | 0 | 50 | 50 | 2 |
| 9 | 14253107 | Human Values and Professional Ethics* | * | 2 | 0 | 0 | 30 | 0 | 0 |
| Total: | | | | | | | 280 | 520 | 22 |

***** Audit Course

# III Year-II Semester

| S. No. | Subject Code | Subject | SC | L | T | P | IM | EM | CR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14043201 | Digital Communications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 2 | 14043202 | Microprocessors & Interfacing | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 3 | 14043203 | Microwave Engineering | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 4 | 14043204 | Digital Signal Processing | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 5 | 14043205 | VLSI Design | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 6 | <br>14053212<br>14053213<br><br>14053214 | Elective - I<br>1. Data structures<br>2.Computer Networks<br>3.Database Management Systems | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 7 | 14043206 | Communication Engineering Lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |
| 8 | 14043207 | Linear and Digital IC Applications Lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |
| Total: | | | | | | | 280 | 520 | 22 |

# IV Year-I Semester

| S. No. | Subject Code | Subject | SC | L | T | P | IM | EM | CR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14254101 | Management Science | HS | 4 | 0 | 0 | 30 | 70 | 3 |
| 2 | 14044102 | Microcontrollers & Applications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 3 | 14044103 | Electronic Measurements and Instrumentation | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 4 | 14044104 | Optical communications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 5 | <br>14044105<br>14044106<br>14054112 | Elective – II<br>1. RADAR Systems<br>2. Speech Processing<br>3. OOPS through Java Programming | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 6 | <br>14044107<br><br><br>14054108<br><br>14044108 | Elective – III<br>1. Embedded Real Time Operating Systems<br>2.Neural networks and Fuzzy Logic<br>3.Data Communications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 7 | 14044109 | Microwave & Optical Communications Lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |
| 8 | 14044110 | Microprocessors & DSP lab | PJ | 0 | 0 | 3 | 50 | 50 | 2 |
| Total: | | | | | | | 280 | 520 | 22 |

# IV Year-II Semester

| S. No. | Subject Code | Subject | SC | L | T | P | IM | EM | CR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14044201 | Cellular & Mobile Communications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 2 | 14044202 | Digital Image Processing | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 3 | 14044203 | Satellite Communications | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 4 | 14044204<br>14044205<br>14044206 | Elective – IV<br>1.Data acquisition systems<br>2. Spread Spectrum Communications<br>3. Biomedical Instrumentation | PJ | 4 | 0 | 0 | 30 | 70 | 3 |
| 5 | 14044207 | Seminar | PJ | 0 | 0 | 0 | 100 | 0 | 3 |
| 6 | 14044208 | Project | PJ | 0 | 0 | 0 | 50 | 50 | 10 |
| Total: | | | | | | | 270 | 330 | 25 |
| I B.Tech. | | | | | | | 410 | 690 | 45 |
| Grand Total | | | | | | | 2080 | 3620 | 180 |

**II B.Tech. I Sem (ECE)**

# Mathematics – III

(Common to EEE & ECE Branches)

**UNIT I**

**Special Functions:** Beta function - Gamma Function - Relation between Beta and Gamma Function and their properties. – Evaluation of improper integrals- Series solutions of Differential Equations – Power series method and Frobenius method.

**UNIT II**

**Bessel functions** – Solution of Bessel equation - Recurrence formulae for $J_n(x)$ - Generating function for $J_n(x)$ - Jacobi series – Orthogonality of Bessel functions - Legendre polynomials – Solution of Legendre's equation – Legendre Polynomials - Rodrigue's formula -Generating function for $P_n(x)$ - Recurrence formulae for $P_n(x)$ - Orthogonality of Legendre polynomials.

**UNIT III**

**Functions of a complex variable** – Limit – Continuity -Differentiability - Analytic function – Properties – Cauchy – Riemann equations in cartesian and polar coordinates - Harmonic and Conjugate harmonic functions. - Construction of analytic function using Milne - Thomson method. Applications to flow problems. Conformal Transformation: Some standard transforms – translation, rotation, magnification, inversion and reflection. Bilinear transformation – invariant points. Special conformal transformations $w = e^z$ , $z^2$, sinz , cosz.

**UNIT IV**

**Complex integration:** Line integral - Evaluation along a path and by indefinite integration - Cauchy's theorem - Cauchy's integral formula - Generalized integral formula. Complex power series - Taylor's series and Laurent series with problems. Singular point – Isolated singular point – Simple pole, Pole of order *m* - Essential singularity.

**UNIT V**

**Residues:** Evaluation of residues by formula. Cauchy's residue theorem - Evaluation of the real definite integrals of the type (i) Integration around the unit circle $\int_0^{2\pi} f(\cos\theta,\sin\theta)d\theta$ (ii) integration around a small semi circle $\int_{-\infty}^{\infty} f(x)dx$ (iii) Integration around the rectangular contour $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ and (iv) Integration around the indenting contour having the poles on real axis.

**Text Books:**

1. Higher Engineering Mathematics, Dr. B.S Grewal, Khanna Publishers-42 edition.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Willey Publications, 9th edition- 2013.

**Reference Books:**

1. Higher Engineering Mathematics, B.V. Ramana, Mc. Graw Hill Education(India) Private Limited.
2. Advanced Engineering Mathematics by N. Bali, M Goyal, Firewall Media 7th edition.
3. Engineering Mathematics, Volume – III , E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.

**II B.Tech. I Sem. ECE**

# Environmental Studies

(Common for all branches)

## Course Objectives:

- To create awareness regarding various environmental problems and their effect on the society

### UNIT I

**Multidisciplinary nature of environmental studies:** Definition, scope and importance – Need for public awareness

**Natural Resources:** Renewable and non-renewable resources – Natural resources and associated problems; (a) Forest resources – Use and over-exploitation, deforestation, case studies – Timber extraction, mining, dams and their effects on forest and tribal people; (b) Water resources – Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems; (c) Mineral resources – Use and exploitation, environmental effects of extracting and using mineral resources, case studies; (d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies; (e) Energy resources –Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies; (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles

### UNIT II

**Ecosystems:** Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystems (a) Forest ecosystem, (b) Grassland ecosystem, (c) Desert ecosystem, (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

### UNIT III

**Biodiversity and its conservation: Introduction:** Definition : genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity

### UNIT IV

**Environmental Pollution: Definition:** Cause, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g). Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution – Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides

### UNIT V

**Social Issues and the Environment: From Unsustainable to Sustainable development** – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns; • Environmental ethics : Issues and

possible solutions; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies; Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness

**Human Population and the Environment:** Population growth, variation among nations – Population explosion – Family Welfare Programme; Environment and human health; Human Rights; Value Education; HIV/AIDS; Women and Child Welfare; Role of Information Technology in Environment and human health, case studies; Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

## Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grant Commission, Universities Press.
2. Environmental Studies by Benny Joseph,Mc.Graw Hill Publications.
3. Principles and a basic course of Environmental science for under graduate course by Kousic, KouShic.
4. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.

## Reference Books:

1. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
2. Environmental Studies by Anindita Basak – Pearson education
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela- Printice hall of India Private limited.

**II B.Tech., I Semester (ECE) (To be approved by EEE BOS)**

# Electrical Circuits & Networks

## Objectives:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basis analysis of circuits which includes single phase circuits, magnetic circuits, theorems, transient analysis and network topology.

**UNIT-I**

**Introduction to Electrical Circuits:** circuit concepts, classification of network elements, voltage & current sources; independent & dependent sources, source transformation techniques, R-L-C Parameters, Voltage - Current relationship for passive elements. Kirchhoff's laws, network reduction techniques – series, parallel, series parallel, Y/Δ- Transformations, Mesh and Nodal analysis for D.C excitation.

**UNIT-II**

**Single Phase AC Circuits:** RMS, Average values, form factor, peak factor for different periodic waveforms, phase, phase difference, phasor notation, J-notation. Concept of Reactance, Impedance, Susceptance, and Admittance, Active & Reactive power, Power factor, power triangle. Response of R, L & C elements for Sinusoidal excitation, steady state analysis of RL, RC and R-L-C(Series, parallel, series parallel) Circuits for sinusoidal excitations, phasor diagram. Steady state analysis of A.C Circuits using mesh and nodal analysis.

**UNIT-III**

**Series and Parallel resonance:** Resonant frequency, Half Power frequency, Band width, Q – Factor, Relation b/w them, problems.

**Locus Diagrams:** Impedance & admittance locus diagrams of RL & RC Series circuits and two branch parallel circuits.

**UNIT-IV**

**Magnetic Circuits:** Concept of self & mutual inductances, Dot Convention, Problems, Coefficient of coupling, Composite Magnetic circuit, analysis of Series and Parallel Magnetic Circuits, Duality and dual Circuits, problems.

**Network Topology:** Definition – Graph, tree, Co-tree, Incidence Matrix, Tie-Set & Cut – Set Matrices for Planar networks, Problems.

**UNIT-V**

**Network Theorems:** Superposition Theorem, Thevinin's Theorem, Norton's Theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millmen's theorem, Tellegen's theorems for D.C and Sinusoidal Excitations.

## Text Books:

1. Network Analysis – Van Valkenburg - 3rd edition, PHI.
2. Engineering Circuit Analysis – William H. Hayt –Jack E. Kimmerly – TMH
3. Fundamentals of Electric Circuits – Charles's, Alexander & Mathew N.o. Sadiku, TMH 3rd Edition.
4. Electrical Circuits – N. Sreenivasulu – Reem Publications

## Reference Books:

1. Circuits & Networks – A. Sudhakar , Shayammohan.S. Pillai, 4th Edition – TMH.
2. Theory and Problems of Electrical Circuits – Joseph A. Edminister – Schaum Series, 1st Edition – TMH.

3. Network Analysis – N C Jagan & C. Lakshmi Narayana, BSP.

## II B.Tech.-I Sem (ECE)

# Electronic Devices and Circuits

(Common to EEE & ECE Branches)

## Course Objectives:

- To understand electronic devices, including diodes, bipolar junction transistors and FET
- To understand basic circuits of the electronic devices

**UNIT-I**

**Semiconductors:** Intrinsic and extrinsic semiconductors, mobility and conductivity, Fermi level and carrier concentration of semi conductors, Drift and diffusion currents , continuity equation , hall effect.

**PN junction diode:** Band structure of PN Junction, Quantitative Theory of PN Diode, Volt – Amp. Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction,

**UNIT-II**

**Special Diodes:** Zener and Avalanche Breakdowns, Tunnel Diode, LED, Schottky Barrier Diode, Varactor Diode, Photo Diode, SCR.

**Rectifiers:** Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics.

**UNIT-III**

**Bipolar Junction Transistors:** NPN and PNP junction Transistor, Characteristics of Current Flow across the Base Regions, Minority and Majority Carriers CB, CE and CC Configurations and their Input and Output Characteristics. Comparison of CE, CB and CC Configurations. Junction Biasing for Saturation, Cutoff and Active Region, $\alpha$ and $\beta$ Parameters and the relation between them.

**UNIT-IV**

**Juncton Field Effect Transistor (JFET):** JFET and its characteristics, Pinch off Voltage, Drain Saturation Current, MOSFET –Enhancement and Depletion Modes, Small signal models of FET.

**UNIT-V**

**Transistor Biasing Circuits:** Various Biasing Circuits and Stabilization, Thermal Runaway, Thermal Stability, Biasing of FETs. Transistor as an Amplifier, h – parameter model, Analysis of Transistor Amplifier Circuits using h-parameters. CB, CE and CC Amplifier configurations and performance factors.

## Text Books:

1. Electronic devices and circuits, Jacob Millman and D. Halkias, McGraw Hill.
2. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill.

3. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.
4. Electronic devices and circuits by S.Salivahanan.

**II B.Tech.-I Sem (ECE)**

# Signals and Systems

## Course Objectives:

- The objective of the course is to analyze the response of linear, time-invariant dynamic systems to standard input signals
- To Study the different standard signals that can be applied to the various systems for the estimation of their performance.

**UNIT-I**

**Introduction:** Definition and Classification of Signals, Elementary signals, Basic operations on signals.

**Fourier series representation of periodic signals:** Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions. Representation of function by a set of mutually orthogonal functions, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Spectrum and its significance, Amplitude and Phase spectra.

**UNIT-II**

**Fourier transforms:** Fourier transform(FT), Fourier transform of standard signals, properties of Fourier transforms, Fourier transforms involving impulse function, Fourier transform of periodic signals, Hilbert Transform and its properties, Pre-envelope and bandpass signals.

**UNIT-III**

**Signal transmission through LTI systems:** Systems, Classification of Systems, Linear time invariant (LTI) system, Transmission of signals through LTI systems, Transfer function of a LTI system. Distortion less transmission through LTI system, Causality & Stability.

**Convolution and correlation of signals:** Graphical method of convolution, auto correlation and Cross correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between convolution and correlation, Applications of convolution and correlation.

**UNIT-IV**

**Laplace Transform:** Definition , ROC , Properties , Inverse Laplace transform , The S-plane and BIBO stability , Transfer functions , System response to standard signals.

**UNIT-V**

**Discrete Time Signals and Systems:** Unit impulse, step, ramp, and exponential signals, Periodicity of signals , Operations of signals, Linear Shift Invariant(LSI) system, Stability , Causality , Convolution and Correlation , Linear constant coefficient difference equation , Impulse response , Discrete time Fourier transform , Properties , Transfer function , System analysis using DTFT.

## Text Books:

1. Simon Haykin, *Communication Systems*, 2nd Edition, Wiley-Eastern.
2. Oppenheim AV and Willisky, *Signals and Systems*, 2nd Edition, Pearson Edition.
3. B.P.Lathi , *Communication Systems* , Wiley Eastern.

## References Books:

1. Simon Haykin and Van Veen,Wiley, *Signals & Systems*, 2nd Edition.
2. Schaum's, *Outline of Theory Problems of Signals and Systems*, McGraw-Hill

**II B.Tech.-I Sem. (ECE)**

# Switching Theory and Logic Design

(Common to EEE & ECE Branches)

## Course Objectives:

- To provide the students with an introduction to the fundamentals of Number systems, logic gates, Combinational and sequential circuits

**UNIT I**

**Number Systems & Codes**: Philosophy of number systems –complement representation of negative numbers-binary arithmetic, binary codes-error detecting & error correcting codes –hamming codes.

**UNIT II**

**Boolean Algebra and Minimization of Switching Functions**: Fundamental postulates of Boolean Algebra - Basic theorems and properties –Canonical and Standard forms- Minimal SOP and POS forms ,Algebraic simplification digital logic gates –universal gates-Multilevel NAND/NOR realizations. The map method, tabulation method

**UNIT III**

**Combinational Logic Design**: Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

**UNIT IV**

**Programmable Logic Devices**: Basic PLD's-ROM, PROM, PLA, and PLD, Realization of Switching functions using PLD's. .

**UNIT V**

**Sequential Circuits**: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.

## Text Books:

1. Switching & Finite Automata theory – Zvi Kohavi, TMH, 2nd Edition.
2. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.
3. Switching Theory & Logic Design – A.Anand Kumar, 2008, PHI

## Reference Books:

1. An Engineering Approach To Digital Design – Fletcher, PHI. Digital Logic – Application and Design – John M. Yarbrough, Thomson.
2. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
3. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

**II B.Tech.-I Sem (ECE)**

# Electronic Devices & Circuits Lab

**(Common to ECE & EEE)**

## Course Objectives:

- To know the different devices- their characteristics and applications
- To study the design and analysis of amplifier circuits

## Electronic Workshop Practice (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB s
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Lowpower JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, UJT.
3. Study and operation of Multimeters (Analog and Digital), Function Generator, Regulated Power Supplies,
   Study and Operation of CRO.

## List of Experiments:

1. Forward and Reverse bias characteristics of PN Junction diode
2. Zener diode characteristics and Zener diode as Voltage Regulator.
3. Input and Output characteristics of Transistor in CB Configuration.
4. Input and Output characteristics of Transistor in CE Configuration.
5. Half Wave Rectifier With and without filter.
6. Full wave Rectifier With and without filter.
7. Bridge rectifier With and without filter.
8. FET characteristics
9. VI characteristics of LED
10. Characteristics of Photo transistor
11. Characteristics of Photo diode
12. SCR Characteristics.
13. UJT Characteristics.

## Equipment required for Laboratories:

1. Regulated Power supplies (RPS) - 0-30v.
2. CROs - 0-20M Hz.
3. Function Generators - 0-1 M Hz.
4. Multimeters -
5. Decade Resitance Boxes/Rheostats -
6. Decade Capacitance Boxes -
7. Micro Ammeters (Analog or Digital)- 0-20 μA, 0-50μA, 0-100μA, 0-200μA.
8. Voltmeters (Analog or Digital) - 0-50V, 0-100V, 0-250V.
9. Electronic Components - Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes (Ge& Si type), transistors , (NPN & PNP type) & Si type), transistors , (NPN & PNP type)

**II B.Tech. I Sem. (ECE)**

# Basic Simulation Lab

## Course Objectives:

- To understand the signal properties and different transforms by using matlab.
- To understand the simulation software.

## List of Experiments:

1. Basic Operations on Matrices
2. Generation of Various signals and Sequences (Periodic and Aperiodic), Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, sinc function.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of Signal.
5. Convolution between Signals and Sequences.
6. Autocorrelation and Cross correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a Given Continuous / Discrete System.
8. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the Given LTI System and Verifying its Physical Realizability and Stability Properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given Signal and plotting its Magnitude and Phase Spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating Zeros and Poles, and plotting the Pole-Zero maps in S-Plane and Z-Plane for the given Transfer Functions.
13. Generation of Gaussian Noise (Real and Complex), Computation of its Mean, M.S.Values and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling Theorem Verification.
15. Removal of Noise by Auto Correlation / Cross correlation in a given signal corrupted by noise.
16. Impulse response of a raised cosine filter.
17. Verification of Weiner- Khinchine Relations.
18. Checking a Random Process for Stationary in Wide Sense.

**Note: MATLAB of version 7.0 isused for the aqbove experiments.**

**II B.Tech. II Sem. (ECE)**

# Managerial Economics and Financial Analysis

## Course Objectives:

1. To equip the student with an understanding of concepts and tools and economic Analysis.
2. Provide knowledge of Managerial Economics through differential Economics concepts, accounting concepts.
3. An understanding of professional and ethical responsibility and ability to communicate effectively.

**UNIT-I**

**INTRODUCTION TO MANAGERIAL ECONOMICS:** Definition, Nature and Scope of Managerial Economics – relation with other disciplines – Demand analysis – Determinants, Law of Demand and its exceptions – Elasticity of Demand – Types and Measurement of Elasticity of Demand – Methods of Demand Forecasting.

**UNIT-II**

**Theory of Production and Cost Analysis:** Production Function – Isoquants and Isocost, MRTS, least cost combination of inputs, Cobb- Douglas production function, laws of returns, internal and external economies of scale.

**Cost Analysis:** Cost concepts and classification – Break –Even Analysis (BEA) – Determention of Break Even Point – Managerial significance and limitation of BEA.

**UNIT-III**

**Introduction to Market and Pricing Policies:** Markets structures : Types of competition, Features of perfect competition, Monopoly – Monopolistic competition. Price- Output determination under perfect competition and monopoly – Methods of pricing – cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.

**UNIT-IV**

**Business Orginations and New Economic Environment:** Characteristic features of business, features of sole proprietorship, partnership, Joint Stock Company and public enterprises – Changing business environment in post – liberalization scenario.

**Capital:** significance, Types, Method and sources and raising finance – Capital Budgeting Methods – Pay back Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

**UNIT-V**

**Financial Accounting and Analysis:** Double Entry Book keeping, Journal, Ledger, Trail Balance – Final Accounts (Trading, Profit and loss Account and Balance sheet with simple adjustments) – Analysis and interpretation of financial statements through Liquidity, Profitability and Capital structure Ratios.

## Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, sultan chand, 2009.

## Reference Books:

1. Premchand Babu, Madan Mohan : Financial Accounting and Analysis, Himalaya,2009
2. Joseph G. Nellis and David parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
3. M.Sugunatha Reddy: Managerial Economics and Financial Analysis, Research India Publication, New Delhi.

**II B.Tech., II Sem (ECE) (To be approved by EEE BOS)**

# Principles of Electrical Engineering

## Course Objectives:

1. To introduce transient analysis of RLC Circuits using Differential Equations and Laplace Transforms.
2. To introduce concepts of two-port Networks.
3. To learn Principles of DC Machines, Transformers and Alternators.

**UNIT-I**

**Transient Analysis (First and Second Order Circuits):** Transient Response of RL, RC Series, RLC Circuits for DC excitations, Initial Conditions, Solution Using Differential Equations approach and Laplace Transform Method.

**UNIT-II**

**Two Port Networks:** Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one Parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of two port networks in series, parallel and cascaded configurations, IIIustrative problems.

**UNIT-III**

**DC Machines**: Principle of Operation of DC Machines, EMF equation, Types of Generators, Magnetization and Load Characteristics of DC Generators. DC Motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test.

**UNIT-IV**

**Transformers and Their Performance:** Principle and Operation of Single Phase transformer, Types, Constructional Features, Phasor Diagram on No Load and Load Equivalent Circuit, Losses and Efficiency of Transformer and Regulation, OC and SC Tests, Predetermination of Efficiency and Regulation (Simple Problems).

**UNIT-V**

**Alternators:** Constructional features of salient and non – salient pole type machines, E.M.F equation, synchronous reactance and impedance, calculation of voltage regulation by synchronous impedance method, Stepper Motor.

## Text Books:

1. Engineering Circuit Analysis by W. H. Hayt, J. E. Kemmerly and S. M. Durbin, 6th Edition, 2008, TMH.
2. Fundamental of Electric Circuits by Charles K. Alexander and Mathew N. O. Sadiku, 3rd Edition, 2008, TMH.
3. Network Analysis by A. Sudhakar, Shyammohan S. Pillai, 3rd Edition. 2009, TMH.
4. Introduction to Electrical Engineering by M. S. Naidu and S. Kamakshaiah, 2008, TMH.

## Reference Books:

1. Networks, Lines and Fields by John. D. Ryder, 2nd Edition, 2008(Reprint), PHI.
2. Networks Analysis and Synthesis by C. L. Wadhwa, 3rd Edition, 2007, New Age International Publishers.
3. Network Analysis by N.C. Jagan and C. Lakshmi Narayana, ESP, 2006.
4. Electric Circuits by Nilson, Riedel, 8th Edition, PE.

# B.Tech. II Year II Sem. (ECE)

## Electronic Circuit Analysis

### Course Objectives:

- To provide knowledge about single stage amplifiers, multi-stage amplifiers, feed back amplifiers, large signal amplifiers, differential ,tuned amplifiers and FET amplifiers and their analysis.
- To provide knowledge about working and design of oscillators.
- Different transistor models at high frequencies.

**UNIT-I**

**General Amplifiers**: Concept of amplifier, Voltage gain, current gain, input and output resistances, conversion efficiency, frequency response, Bandwidth, Distortion, classification of amplifiers, amplifier circuits using BJT and FET and their biasing schemes.

**UNIT-II**

**BJT Amplifiers**: Hybrid model, small signal analysis of a single stage BJT Amplifiers, Comparison of CE, CB and CC amplifiers, Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response, Hybrid-$\pi$ model at high frequencies, parameters f$\alpha$ f$\beta$ and $f_T$

**UNIT-III**

**FET Amplifiers**: Small signal model, Analysis of CS, CD and CG amplifiers, High frequency response.

**Multistage Amplifiers**: Types of coupling, choice of amplifier configurations, overall gain and band width of n-stage amplifier, Analysis of two stages RC coupled amplifiers, Darlington and Bootstrap circuits.

**UNIT-IV**

**Feed back Amplifiers**: Feed back concept, classification, Effects of negative feed back on gain, stability, noise, distortion, bandwidth, input and output resistances. Different types of feed back circuits.

**Sinusoidal oscillators**: Barkhausen criterion, RC phase shift, Wein bridge, Hartley and Colpitts oscillators.

**UNIT-V**

**Tuned amplifiers**: Introduction, Q-factor, small signal tuned amplifiers, effect of cascading single tuned amplifiers on bandwidth, effect of cascading double tuned amplifiers on bandwidth, stagger tuned amplifier , stability of tuned amplifiers.

**Power amplifiers:** Classification of power amplifiers, efficiency of class-A, class-B power amplifiers, complementary symmetry push pull power amplifier.

### Text Books:

1. Millman & Halkias, “Integrated Electronics” Mc Graw-Hill Co.
2. Mottersed, “Electronic Devices and Circuits” Prentice –Hall of India
3. S.Salivahanan – “Electronic Devices and Circuits” - TMH

# B.Tech. II Year II Sem. (ECE)

## Pulse and Digital Circuits

### Course Objectives:

- To provide the fundamentals of linear and nonlinear wave shaping and multivibrators.

**UNIT I**

**Linear Waveshaping:** High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. High Pass RC network as Differentiator, Low Pass RC network as integrator, attenuators and its applications as a CRO probe, illustrative Problems.

**UNIT II**

**Non-linear Wave shaping:** Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, applications of voltage comparators, clamping operation, clamping circuits taking source and Diode resistances into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized Clamping.

**UNIT III**

**Multivibrators:** Transistor as a switch, Break down voltages, Transistor-Switching Times. Analysis and Design of Bistable, Monostable, Astable Multivibrators and their triggering circuits. Schmitt trigger circuit using BJT.

**UNIT IV**

**Time Base Generators:** General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Transistor Current time base generators, Methods of linearity Improvements.

**Synchronization and Frequency Division:** Pulse Synchronization of relaxation Devices, Frequency division in sweep circuit, Stability of relaxation Devices, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

**UNIT V**

**Sampling Gates:** Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Four Diode Sampling Gate, Reduction of pedestal in gate circuits, Six Diode Gate, Applications of Sampling Gates.

**Digital Logic Circuits:** AND, OR, & NOT gates using Diodes, and Transistors, Analysis of DCTL, RTL, DTL, TTL, ECL and CMOS Logic Families, and comparison between the logic families.

### Text Books:

1. J.Millman, H.Taub and Mothiki S. Prakash Rao, " Pulse, Digital and Switching Waveforms",TMH ,2nd Edition, 2008.
2. David A. Bell, "Solid State Pulse Circuits", PHI, 4th edition, 2002.
3. Pulse Circuits – Michel

### Reference Books:

1. Jacob Millman, Christos C. Halkias, "Integrated electronics" Tata McGraw Hill Publication
2. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2005.
3. Ronald J. Tocci, "Fundamentals of Pulse and Digital Circuits", 3rd edition, 2008

**II B.Tech. II Sem. (ECE)**

# Electromagnetic Theory & Transmission lines

## Course Objectives:

1. Understanding and increasing the ability to use vector algebra, and vector calculus.
2. Proficiency in the use of vector identities, and various Coordinate systems & transformations
3. Providing the basic education in static electromagnetic fields and time varying electromagnetic waves.
4. Analyzing and solving the problems of electric and magnetic fields that vary with three dimensional spatial co-ordinates as well as with time.
5. Developing analytical skills for understanding propagation of electromagnetic waves in different media.
6. Understanding the concepts of transmission lines & their applications.

**UNIT-I**

**Electrostatics:** review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations between E and V, Maxwell's two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

**UNIT-II**

**Magneto statics:** Biot-savart's law, Ampere's law and applications, Magnetic flux density, Maxwell's two equations for magneto static fields, magnetic scalar and vector potentials, Forces due to Magnetic fields, Ampere's force law, inductances and magnetic energy, illustrative problems.

**UNIT-III**

**Maxwell's Equations (Time varying fields):** Faraday's law and transformer emf, Inconsistency of ampere's law and displacement current density, Maxwell's equations in different final forms and word statements, conditions at boundary surface: Dielectric-Dielectric and Dielectric-conductor interfaces, illustrative problems.

**UNIT-IV**

**EM wave characteristics:** Wave equations for conducting and perfect dielectric media, Uniform plane waves-Definition, All relations between E&H, Sinusoidal variations, Wave propagation in loss less and conducting media, conductors& dielectrics- characterization, wave propagation in good conductors and good dielectrics, polarization.

**Reflection and Refraction of plane waves:** Normal and Oblique incidences for both perfect conductors and dielectrics, Brewster angle, Critical angle and total internal reflection, Surface impedance, pointing vector and pointing theorem-applications, power losses in a plane conductor, illustrative problems.

**UNIT-V**

**Transmission lines:** Types, parameters, Transmission line equations, Primary & Secondary constants, Expression for characteristic impedance, Propagation constant, Phase and group velocities, Loss less and low loss characterization, Distortion- condition for Distortion less and minimum attenuation, input impedance relations, SC and OC lines, Reflection coefficient, VSWR, Smith chart & its applications, illustrative problems.

## Text Books:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics," Oxford Univ. Press, 4th ed., 2008.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics," TMH, 7th ed., 2006.
3. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems "PHI, 2nd Ed., 2000.

**Reference Books:**

1. John D. Krauss, "Electromagnetics", McGraw- Hill publications, 3rd ed., 1988.
2. John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.
3. Schaum's out – lines, "Electromagnetics,", Tata McGraw-Hill publications, Second Edition, 2006.

## II B.Tech. II Sem. (ECE)

# Probability Theory & Stochastic Processes

## Course Objectives:

- The Objective of this course is to provide the students with knowledge about the random variable, random process.
- To model the random processes in the communication system such as receiver performance, interference, thermal noise, and multipath phenomenon.

**UNIT-I**

**Probability**: Axioms, Joint and conditional probability , Bayes' theorem , Bernoulli trials.
**Random Variable**: Concept , Distribution functions , Density functions ,conditional density functions.

**UNIT -II**

**Operations on Single random variables**: Expectation , Conditional expected value , Moments , Chebyshev, Markov's, and Chernoffs inequalities , Characteristics and moment generating functions , Transformation of continuous, discrete random variable.

**UNIT-III**

**Multiple Random Variables**: Vector random variables , Joint distribution / Density functions , Conditional density / Distribution functions , Statistical independence , pdf and cdf for sum of random variables , Central limits theorem
Operations on multiple random variables , Expected value of function of random variables , Joint characteristic function , Joint by Gaussian random variables , Transformations of multiple random variables.

**UNIT – IV**

**Random Processes** :Concept , Stationarity , Independence , Time averages , Ergodicity , Correlation functions and its properties, Gaussian, Poisson, and Markov processes ,Power spectral density and its properties , Relation between power spectral density and auto-correlation , Cross power spectral density and its properties , Power spectrum for discrete time processes and sequences ,Definition of white and colored noise.

**UNIT-V**

**Linear Systems with Random Inputs:** Random signal response of linear system , System evaluation using random noise, Spectral characteristics of system response , Noise bandwidth, Band pass, Band limited, and Narrow band processes , Properties of band limited processes.

## Text Books:

1. P.Z.Peebles Jr., "Probability Random Variables and Random Signal Principles". Tata McGraw-Hill, 4thdition, 2001.
2. A.Papoulis and S.Unnikrishna Pillai, "Probability Random Van ables and Stochastic Processes", PHI, 4th edition, 200?
3. J.LAunon and VChandrasekhar, "Introduction to Probability Random Processes", McGraw-Hill 1997.
4. D.GChilder, "Probability and Random Processes", McGraw, Hill,1997.
5. G.R.Babu and K.Pushpa, "Probability Theory and Stochastic Processes", Premier Publishing House,

**II B.Tech. II Sem. (ECE)**

# Electronic Circuit Analysis Lab

## Course Objectives:

- Working of different feedback amplifiers with frequency responses.
- Working of different Oscillators using transistors.

## Design and Simulation in Simulation Laboratory using any Simulation Software.

## I Testing in the Hardware Laboratory (Minimum of 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. Common collector Amplifier
4. A Two Stage RC Coupled Amplifier.
5. Current shunt and Voltage Series Feedback Amplifier
6. Hartley oscillator
7. Wien Bridge Oscillator using Transistors
8. RC Phase Shift Oscillator using Transistors
9. Class A Power Amplifier (Transformer less)
10. Class B Complementary Symmetry Amplifier
11. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

## II Testing in the Software Laboratory (6 Experiments)

1. Common Emitter Amplifier
2. Common Source Amplifier
3. Common collector Amplifier
4. A Two Stage RC Coupled Amplifier.
5. Current shunt and Voltage Series Feedback Amplifier
6. Hartley oscillator
7. Wien Bridge Oscillator using Transistors
8. RC Phase Shift Oscillator using Transistors
9. Class A Power Amplifier (Transformer less)
10. Class B Complementary Symmetry Amplifier
11. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

**II B.Tech. II Sem. (ECE) (To be approved by EEE BOS)**

# Electrical Engineering Lab

## Course Objectives:

1. To give practical knowledge of Network Theorems and Two port Networks
2. To make students perform various tests and learn about DC motors, generators, and single phase transformers.

## Part-A

1. Verification of KVL and KCL.
2. Series and parallel Resonance – Resonant frequency, Bandwidth and Q – factor determination for RLC network.
3. Two port network parameters – Determination of Z and Y parameters and analytical verification.
4. Two port network parameters – Determination of ABCD and h-Parameters and analytical verification.
5. Verification of Superposition and Reciprocity theorems.
6. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
7. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

## Part-B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance and critical speed.
2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC machine working as motor and generator)
3. Brake test on DC shunt motor. Determination of performance characteristics.
4. OC & SC tests on Single – Phase transformer ( Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Load test on single phase transformer.
6. Determination of voltage regulation of an alternator by synchronous impedance method.

**Note:** Any 10 of the above experiment are to be conducted, at least 5 from each part.

**III.B.Tech. I Sem. (ECE) (To be approved by EEE BOS)**

# Control Systems

## Course Objectives:

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

**UNIT-I**

**Control System Concepts:** Classification, Historical development. Transfer function, Effect of feedback, mathematical modeling of Physical Systems, block diagram, reduction techniques – signal flow graphs and mason's gain formula. Transfer function of DC servo motor - AC servo motor – Synchro transmitter and receiver.

**UNIT-II**

**Time Domain Analysis:** Standard test signals, Time response of first and second order systems- Time response specifications – Steady state error and error Constants – Effects of proportional, derivative and integral control.

**UNIT-III**

**Concept of Stability and Root Locus:** The Concept of Stability, necessary Conditions for stability – Routh Hurwitz's Criterion – Limitations of Routh's stability, Relative stability analysis – Root Locus Concept – Construction of Root Loci.

**UNIT-IV**

**Frequency Domain Analysis:** Correlation between time and frequency response, Frequency domain Specifications. Bode Plots, Polar plots, Nyquist stability Criterion - Gain and Phase margin.

**UNIT-V**

**Compensation Techniques for Linear Control Systems:** System Design and Compensation – Realization of basic lead, lag and lead – lag cascade Compensations in frequency domain.

## Text Books:

1. "Control Systems Engineering" by I. J. Nagrath and M. Gopal, New age International (P) Limited, Publishers, 5th edition, 2007.
2. "Automatic Control Systems" by B. C. Kuo and Farid Goinaraghi – John Wiley and Son's, 8th edition, 2003.
3. "Control Systems" by A. Anand Kumar, Prentice Hall of India Pvt. Ltd.

## Reference Books:

1. "Modern Control Engineering" by Katsuhiko Ogata,Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. "Control Systems Engineering" by NISE, 5th edition, John Wiley.

**III B.Tech. I Sem. (ECE)**

# Analog Communications

## Course Objectives:

- To analyze various transmitter and receiver functions and circuits.
- To analyze different modulation and demodulation techniques.

**UNIT-I**

**Elements of Electrical communication system:** Modulation and its needs and types, Fundamental physical limitations, Electromagnetic Spectrum and Area of Applications.
Amplitude modulation :Full AM, DSBSC and SSB, generation and detection methods , VSB , frequency translation , FDM ,nonlinear distortion and inter modulation .

**UNIT-II**

**Angle modulation :** Phase and frequency modulation ,NBFM , WBFM ,multi tone FM, transmission band width of FM, direct and indirect generations of FM , Demodulation methods, nonlinear effects, FM versus AM.

**UNIT-III**

**Block diagram study of radio broadcast AM and FM transmitters:** Super heterodyne receivers, choice of IF, AGC ,tracking-characteristics of radio receivers , FM stereo.

**UNIT-–IV**

**Noise:** external and internal sources of noise ,Noise calculations, Noise equivalent resistant, Noise figure , noise temperature , effect of noise in AM and FM modulation system ,FM threshold effect free emphasis and de-emphasis.

**UNIT-V**

**Sampling:** Sampling of continuous time signals, sampling theorem, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Practical aspects of sampling; pulses of finite duration, Flat top sampling.

**Pulse Analog modulation :** PAM generation and detection, PDM and PPM , generation and detection , spectra , synchronization.

## Text books:

1. "Communication Systems"Simon Haykin Wileyestern 1978
2. "Electronic communication systems" Kennedy and Davis 4th edition Mc Graw International edition 1992.
3. "Communication syatems" A.Bruce Carlson Mc Graw Hill ISE 1975.

## Reference Books:

1. "Electronic communications" Dennis Roddy and John Coolen Prentice- Hall of India private Limited 1981.
2. "Modern Digital and Analog communication system" B.P. Lathi Oxford University pree 2nd editions 1996.
3. "Principles of communication Systems"Taub and Schilling Mc Grace Hill ISE 1971.

**III B.Tech. I Sem. (ECE)**

# Linear IC Applications

## Course Objectives:

- To give introduction to OPAMPS, Timers and their applications in various areas.

**UNIT-I**

**Integrated Circuits:** Differential amplifier –DC and AC analysis of Dual input balanced output configuration, Properties of other differential amplifier configuration (dual input balanced/unbalanced output, single ended input balanced/unbalanced output).

**UNIT-II**

**Characteristics of OpAmp:** Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp Inverting and Non-inverting Amplifiers-V/I & I/V converters, summer, differentiator and integrator.

**UNIT-III**

**Applications of OpAmp**: Instrumentation amplifier, Log and Antilog Amplifiers, first and second order active filters(LPF, HPF, BPF & BEF), comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps. Precision diode, Precision Half wave and Full Wave Rectifier, Precision Clipper.

**UNIT-IV**

**Special ICs :** Functional block, characteristics & application circuits with 555 Timer, IC-566 voltage controlled oscillator, IC; 565-phase lock loop, Analog multiplier ICs.
IC voltage regulators LM78XX, 79XX Fixed voltage regulators, ICL 8038 function generator IC.

**UNIT-V**

**D/A and A/D Converters:** Introduction, Basic DAC techniques, weighted resistor DAC, R-2RLadder DAC, Inverted R-2R DAC and IC 1408 DAC, different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC.DAC and ADC specifications.

## Text Books:

1. David A.Bell, 'Op-amp & Linear ICs', Oxford, 2013
2. D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age, 2003
3. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000

## Reference Books:

1. Fiore,"Opamps & Linear Integrated Circuits Concepts & Applications",Cengage,2010.
2. Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013.
3. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system',Tata McGraw Hill, 2003.
4. Robert F. Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', PHI Learning, 6th edition,2012.

**III B.Tech. I Sem. (ECE)**

# Antennas & Wave Propagation

## Course Objectives:

- The student will learn the fundamental principles of transmission line theory related to communications including the propagation of signals on a transmission line and in free space.

**UNIT- I**

**Antenna Basics:** Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height, Illustrative problems. Fields from oscillating dipole, Antenna temperature, front–to-back ratio, antenna theorems, basic Maxwell's equations, retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Directivity, Effective Area and Effective Height. Natural current distributions, far fields.

**UNIT- II**

**Antenna Arrays:** Point sources- Definition, Patterns, arrays of 2 Isotropic sources,Differentcases.Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays, Derivation of their characteristics and comparison, BSA with Non-uniform Amplitude Distributions, Bionomial Arrays.

**UNIT- III**

**VHF, UHF AND Microwave Antennas:** Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles &their characteristics. Helical Antennas, Horn Antennas, Micro strip Antennas.

**Antenna Measurements:** Introduction, Directivity Measurement, Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

**UNIT- IV**

**Wave Propagation-I:** Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/ Mode concepts. Ground wave propagation (Qualitative treatment)- Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections. Space wave propagation- Introduction, field strength variation with distance and height, effect of earth's curvature, absorption. Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations.

**UNIT- V**

**Wave Propagation-II:** Sky wave propagation- Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges.

## Text Books:

1. Antennas and wave propagation – John D. Kraus and Ronald J.Marhefka and Ahmad S.Khan, TMH, New Delhi, 4th Ed., (special Indian Edition), 2010
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and. Balmain, PHI, 2nd ed., 2000.
3. Antenna Theory - C.A. Balanis, John Wiley & Sons, 2nd ed., 2001.
4. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan,Tech India Publications, New Delhi, 2001.

**III B.Tech. I Sem. (ECE)**

# Computer Organization

(For ECE & EEE branches)

## Course Objectives:

1. To give the concepts related to Computer Organization and Design
2. To introduce CPU, Memory, I/O Devices

**UNIT-I**

**Basic Structure of Computers:** Computer Types, Functional Units, Basic operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers.

**Register Transfer and Micro Operations**: Register transfer, Bus and Memory transfers, Arithmetic micro operations, Logic micro operations, Shift Micro Operations, Arithmetic Logic shift units.

**UNIT-II**

**Basic Computer Organization and Design:** Instruction codes, computer Registers and instructions, Timing and control, instruction cycles, memory- reference instructions, Input-Output and interrupt.

**Microprogrammed Control**: Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

**UNIT-III**

**Central Processing Unit:** General register Organization, Stack Organization, Instruction formats, Addressing Modes, Program Control, RISC, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline.

**UNIT-IV**

**Input-Output Organization:** Peripheral Devices, Input-Output interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, DMA, Input-Output Processor, Serial Communication.

**UNIT-V**

**Memory Organization:** Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual memory, Characteristics of Multiprocessors,
Interconnection Structures, Inter Processor Arbitration, Inter Processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.

## Text Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, Computer Organization ,5th Edition, Tata McGraw Hill.(Unit I-1chapter)
2. M.Moris Mano, Computer Systems Architecture, 3rd Edition, Pearson/PHI.

## Reference Books:

1. William Stallings, Computer Organization and Architecture, 6th Edition, Pearson/PHI.
2. S Andrew S. Tanenbaum, Structured Computer Organization, 4th Edition PHI/Pearson
3. Sivaraama , Dandamudi, Fundamentals or Computer Organization and Design, Springer Int. Edition.
4. John L. Hennessy and David A. Patterson Computer Architecture a quantitative approach, 4th Edition, Elsevier.
5. Joseph D. Dumas II, Computer Architecture: Fundamentals and principles of Computer Design, BS Publication.

**III B.Tech. I Sem. (ECE)**

# Digital IC Applications

**Course Objectives:**

- To introduce VHDL and its language elements to design digital systems.
- Make students familiar with design of different combinational and sequential digital circuits.

**UNIT-I**

## CMOS & Bipolar Logic:

Introduction to logic families, CMOS logic, CMOS logic families, Bipolar logic, Bipolar logic families(TTL,ECL) , ROM- Internal structure, Static RAM and Dynamic RAM.

**UNIT-II**

## The VHDL Hardware Description Language:

Design flow, program structure, types and constants, functions and procedures, libraries and packages.
Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

**UNIT-III**

## Combinational Logic Design:

Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, Combinational multipliers.VHDL modes for the above.

**UNIT-IV**

## Design Examples (USING VHDL):

Design examples (using VHDL) - Barrel shifter, comparators, floating point encoder, dual parity encoder.

**UNIT-V**

## Sequential Logic Design:

Latches and flip-flops, PLDs, counters, ,shift register and their VHDL models, synchronous design methodology.

## Text Books:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/Pearson Education Asia, 3rd Ed., 2005.
2. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.
3. Fundamentals of Digital Logic with VHDL Design – StephenBorwn and Zvonko Vramesic, McGraw Hill, 2nd Edition., 2005.
4. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.

**III B.Tech. I Sem. (ECE)**

# Pulse & Digital Circuits Lab

## Course Objectives:

- To know how to design the digital circuits and Multivibrators

## List of Experiments:

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.
14. Constant Current Sweep Generator using BJT.

# III B.Tech - Advanced English Communication Skills Lab

**(2016-2017)**

**(Common to All Branches)**

## 1. Introduction

The Advanced English Language Skills Lab introduced at the 3rd year B.Tech level is considered essential for the student for focusing on his/her career. At this stage it is imperative for the student to start preparing for the ever growing competition in the job market. In this scenario, in order to be on par with the best, he/she needs to improve his/her Communication and soft skills

This course focuses on the practical aspects of English incorporating all the four (LRSW) skills relevant to the requirements of the prospective employers in view of globalization. The proposed course will enable the students to perform the following:

- Intensive reading to improve comprehension and communication
- Attentive listening for better understanding
- Write project/research/technical reports
- Write Resume' to attract attention
- Discuss ideas / opinions for better solutions
- Face interviews confidently
- Gather information, organize ideas, and present them effectively before an audience
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, CAT, GMAT etc.

## 2. Objectives:

Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student's proficiency in English at all levels. The lab intends t**o** train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career

## 3 . Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

**Reading Comprehension** -- Reading for facts, guessing meanings from context, speed reading, scanning, skimming for building vocabulary(synonyms and antonyms, one word substitutes, prefixes and suffixes, idioms and phrases.)

**Listening Comprehension**-- Listening for understanding, so as to respond relevantly and appropriately to people of different backgrounds and dialects in various personal and professional situations.

**Technical Report Writing—**Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis

**Resume' Writing**—Structure, format and style, planning, defining the career objective, projecting one's strengths, and skills, creative self marketing, cover letter

**Group Discussion**-- Communicating views and opinions, discussing, intervening. providing solutions on any given topic across a cross-section of individuals,(keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.

**Interview Skills**—Concept and process, pre-interview planning, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing

**Technical Presentations (Oral)—** Collection of data, planning, preparation, type, style and format ,use of props, attracting audience, voice modulation, clarity, body language, asking queries.

## 4. Minimum Requirements

The English Language Lab shall have two parts:
The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc.
**System Requirement (Hardware Component):**
Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:
P-IV Processor, Speed-2.8 GHz, RAM_512 MB minimum, Hard Disk-80 GB, Headphones

**Prescribed Software: Walden and K-van Solutions.**

**Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):**


1. **Technical writing and professional communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.
2. **Speaking about Science**, A Manual for Creating Clear Presentations **by Scott Morgan and Barrett Whitener, Cambridge University press, 2006**
3. **Books on** TOEFL/GRE/GMAT/CAT/ IELTS **by Barron's/DELTA/Cambridge University Press.**
4. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008
5. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
6. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010
7. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge University Press, 2008
8. **Resume's and Interviews** by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008
9. **From Campus To Corporate** by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010
10. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
11. **Managing Soft Skills** by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010
12. **Business Communication** by John X Wang, CRC Press, Special Indian Edition,2008

**III B.Tech. I Sem. (ECE)**

# Human Values & Professional Ethics (Audit Course)

**(Common to All branches)**

**Course Objective:**

- This course deals with professional ethics which includes moral issues and virtues, social responsibilities of an engineer right qualities of moral Leadership.

**UNIT-I**

**Engineering Ethics:** Senses of Engineering Ethics – Variety of Moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Consensus and Controversy – Professions and Professionalism – Professional ideals and virtues.

**UNIT-II**

**Engineering as Social Experimentation:** Engineering as experimentation – Engineers as Responsible Experimenters – Research Ethics – Codes of Ethics – Industrial Standards – A Balanced Outlook on Law – The Challenger Case Study.

**UNIT-III**

**Engineer's Responsibility for Safety:** Safety and Risk – Assessment of Safety and Risk – Risk benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Chernobyl Case and Bhopal Case studies.

**UNIT-IV**

**Responsibilities and Rights:** Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property (IPR) – Discrimination.

**UNIT-V**

**Global Issues:** Multinational Corporations – Business Ethics – Environmental Ethics – Computer Ethics – Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Leadership – Sample Code of conduct.

## Text Books:

1. Mike martin and Roland Schinzinger. " Ethics in Engineering '', McGrow Hill, New York 2005
2. Charles E Harris. Michael S Pritchard and Michael J Rabins. " Engineering Ethics – Concepts and Cases ", Thompson Learning 2000.

## Reference Books:

1. Charles D Fleddermann, " Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Baatright. "Ethics and the Conduct of Business", Pearson Education 2003.
3. Edmund G Seeabauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University press 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, " Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
5. David Ermann and Michele S Shauf, " Computers, Ethics and Society", Oxford University Press, 2003.

**III B.Tech. II Sem. (ECE)**

# Digital Communications

## Course Objectives:

- Introduce the students, the fundamentals of digital communication systems
- To make students understand the analysis of digital communications system and fundamentals of channel coding.

**UNIT-I**

**Source coding of analog signals:** Review of sampling theorem, PCM system, Quantization noise, Companding, B.W. requirements of PCM, Differential PCM, Delta modulation, Adaptive delta modulation, Noises in PCM & Delta Modulation, TDM, Asynchronous TDM, Comparison of TDM & FDM.

**UNIT-II**

**Base band data transmission:** Characterization of band-limited channels, Design of band-limited signals for no inter symbol interference (ISI), The Nyquist criterion, Design of band limited signals with controlled ISI, Partial response signals, Transmitting & receiving filters for optimum performance, M-ary signaling scheme, Binary Vs M – ary, Equalization schemes, Eye diagrams.

**UNIT-III**

**Digital carrier modulation schems:** ASK, FSK (coherent& Non Coherent), PSK, DPSK, Baseband signal receiver, Optimum & matched filters, Correlator, Comparison of digital modulation schemes, Bandwidth requirement, Power requirement, Immunity to channel impairments, Equipment complexity, M-ary signaling schemes (8/16PSK,QPSK,QAM), Synchronization methods.

**UNIT-IV**

**Digital Communication system and Information theory:** Model of a digital communication system, Unit of information, Entropy, mutual information, channel models and channel capacity, Shannon's theorem-Shannon- Hartley theorem, Bandwidth, S/N trade-off, source encoding of discrete memory less source, shannon- Fano coding, Huffman coding, coding efficiency.

**UNIT-V**

**Error control coding:** Linear block codes, matrix description, Hamming codes, Decoding, Binary cyclic codes, Algebraic structure, Encoding using shift register, syndrome calculation, BCH Codes, Burst and random error correcting codes- Convolutional codes, code tree diagram, state diagram, trellis diagram Encoders and decoding algorithms.

## Text Books:

1."Communication Systems"Simon Haykin Wileyestern, 3 rd edition.

2. "Sam Shanmugam, K" – Analog & Digital Communication Systems – John Willey & Sons (I,II,III,IV,V)

3. "Modern Digital and Analog communication system" B.P. Lathi Oxford University pree 2nd editions 1996.

## Reference Books:

1 "Simon Haykin" – Digital Communications.

2 "R.P.Singh&S.D.Sapre"–Communication Systems, Analog & Digital, Tata Mc Graw Hill (I,III ,V)

3."Proakis, J.G."- Digital Communications – Mc. Graw Hill (I,II,III,IV)

4 "Taub , H & Schilling D.L." – Principles of communication system, Mc Graw Hill.

5. Bernard Sklar, "Digital Communications", Prentice-Hall PTR, 2nd edition, 2001.

**III B.Tech. II Sem. (ECE)**

# Microprocessors & Interfacing

## Course Objectives:

- To become familiar with 8085 & 8086 Microprocessor Architecture, Instructions, Operating Modes, Programming.
- To use 8086 microprocessor for various applications.
- To study various peripherals for microprocessor based systems.

**UNIT I**

**Introduction to 8085 Microprocessor:** Development of microprocessors, 8085 microprocessor - Architecture, Organization, Instruction set, Addressing modes, Basic Timing Diagrams, Interrupts and Simple Programs.

**UNIT II**

**Introduction to 8086 Microprocessor:** 8086 microprocessor - Architecture, Organization, Instruction set, Addressing modes, Interrupt system. Pin diagram, Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

**UNIT III**

**Assembly Language Programming:** Assembler directives, Assembly language programs (8086) with Assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit manipulation, Programs using look-up tables, Delay subroutines(8085& 8086). Debugging and Documentation.

**UNIT IV**

**Data transfer schemes and Peripheral Interfacing:** Synchronous, Asynchronous, Interrupt driven and DMA type schemes, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller(8257) and its interfacing, Programmable Interval Timer (8253) and its interfacing, Programmable Communication Interface(8251 USART) and its interfacing.

**UNIT V**

**Memory and I/O Interfacing to 8086**: Interfacing Static RAM and ROM chips, 8255 PPI and its interfacing, ADC and DAC Interfacing, Data acquisition, Traffic light controller, Stepper motor control, temperature measurement and control.

## Text Books:

1. Ramesh S.Gaonkar, “Microprocessor architecture, programming and its applications with 8085”, Penram Interantional Publications, IV edition.
2. A.K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", TMH.

## References:

1. Douglas V. Hall, "Microprocessors and interfacing: Programming and hardware", 2nd edition, Tata McGraw-Hill.
2. Barry B.Brey, “The Intel Microprocessors-Architecture, Programming and Interfacing”, 8th edition, PHI.

**III B.Tech. II Sem. (ECE)**

# Microwave Engineering

## Course Objectives:

- To impart Knowledge about various microwave components, microwave junctions, microwave tubes and microwave signal characteristic measurements

**Microwave tubes-I:** Limitations and losses of conventional tubes at microwave frequencies. Microwave tubes-O type and M type classifications. O type tubes: Two cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory-Expressions for O/P power and efficiency. Reflex Klystrons structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency , oscillating modes and O/P characteristics, Effect of Repeller Voltage on Power O/P, Illustrative Problems.

**UNIT-II**

**Helix TWTS:** Significance, types and characteristics of slow wave structures; structure of TWT and amplification process, suppression of oscillations, gain considerations.

**M -Type Tubes:** Introduction, Magnetrons, different types, cylindrical magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Illustrative Problems.

**UNIT-III**

**Microwave Solid State Devices:** Tunnel diode, Gunn diode- principles, RWH theory, characteristics, basic modes of operation - Gunn oscillation modes. LSA Mode, IMPATT diode, PIN diode, Varactor diode, Crystal diode, Schottky Barrier diode, Parametric amplifier, MASER, micro wave transistors and FETs.

**UNIT-IV**

**Microwave Components:** Micro wave cavities- Rectangular cavity resonator, Circular cavity resonator and semi circular cavity resonator, Microwave hybrid circuits-S-parameters of two port network, attenuators, wave guide Tees and their S-matrices, bends, corners and twists. Two hole Directional coupler and it's S-matrix, Ferrites-composition and characteristics, Faraday rotation, Gyrator, Isolators and circulators, S-matrix of circulator and isolator.

**UNIT-V**

**Microwave Measurements:** Measurement of frequency, power, VSWR, Impedance, Reflection coefficient, Attenuation constant and dielectric constant, S-parameters and Q of a cavity.
**Microwave IC's:** Advantages of MICs, Hybrid MICs, striplines, and micro striplines, monolithic MICs.

## Text Books:

1. Samuel Y Liao "Microwave devices and circuits", Prentice Hall 1999.

2. M.Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 1998.

3. Annapoorna Das and Sisir K Das, "Microwave Engineering", Tata McGraw Hill, 2000.

**III B.Tech. II Sem. (ECE); IV B.Tech. I Sem. (EEE)**

# Digital Signal Processing

**(Common to ECE & EEE)**

## Course Objectives:

- To become familiar with Digital Filter design and transform domain Processing.
- To understand the concepts of representation, transformation of the signals and the information they contain.

**UNIT-I**

**Introduction:** Review of Discrete signals & systems, linear constant coefficient difference equations.
**Z–Transforms:** Derivation and definition ,ROC, Properties – Linearity, time shifting, change of scale, Z-domain differentiation differencing, accumulation, convolution in discrete time, initial and final value theorems , Poles and zeros in Z plane-the inverse Z-transform , system analysis , Transfer function , BIBO stability , system response to standard signals ,Solution of difference equations with initial conditions.

**UNIT-II**

**Discrete Fourier Series:** Properties of discrete Fourier series, DFS representation of periodic sequences, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT.
**Fast Fourier Transforms:** Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N.

**UNIT-III**

**Realization of Digital Filters:** Block diagram representation of linear constant-coefficient difference equations, basic structures of IIR filters- direct form I, direct form II, transposed form, cascade form, parallel forms, lattice ladder, basic structures of FIR filters.

**UNIT-IV**

**IIR Digital Filters:** Analog filter approximations-Butterworth and chebyshev, design of IIR digital filters from analog filters, design examples: analog-digital transformations, Illustrative Problems.

**UNIT-V**

**FIR Digital Filters:** Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters, Illustrative Problems, applications of DSP

## Text Books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 3rd edition, 2009.
3. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, 2nd ed., PHI.

## References:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
2. A Text book on Digital Signal processing – R S Kaler, M Kulkarni,, Umesh Gupta, I K International Publisthing House Pvt. Ltd.
3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2007.

**III B.Tech. II Sem. (ECE)**

# VLSI Design

## Course Objectives:

- The main objective of the course is to introduce the concepts of IC fabrication technologies and their corresponding Stick Diagrams
- The course will also introduce scaling techniques of CMOS devices and their effects
- The course will also familiarize the students with CAD/EDA tools

**UNIT-I**

**Introduction:** Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS technologies-Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing,Integrated Resistors and Capacitors.

**UNIT-II**

**Basic Electrical Properties:** Basic Electrical Properties of MOS and BiCMOS Circuits: Ids Vs Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of merit, Pass transistor, NMOS Inverter, Various pull ups and Pull downs, CMOS Inverter analysis and design, Bi-CMOS Inverters.

**UNIT-III**

**VLSI Circuit Design Processes:** VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μ CMOS Design rules for wires, Contacts and ransistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

**UNIT-IV**

**Gate Level Design:** Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Sheet Resistance(RS) concept and Sheet Resistance RS in MOS, Area Capacitance Units, Calculations Delays, Driving large Capacitive Loads, Wiring Capacitances.
**Subsystem Design :** Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators,Comparators, Counters, High Density Memory Elements.

**UNIT-V**

**Semiconductor Integrated Circuit Design:** PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic(PLA'S), Design Approach.

**CMOS Testing:** CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

## Text Books:

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, *Essentials of VLSI circuits and systems*,
   PHI, 2005 Edition.
2. Weste and Eshraghian, *Principles of CMOS VLSI Design*, Pearson Education, 1999.

## Reference Books:

1. John .P. Uyemura, *Introduction to VLSI Circuits and Systems*, JohnWiley, 2003.
2. John M. Rabaey, *Digital Integrated Circuits*, PHI, EEE, 1997.
3. Wayne Wolf, Pearson Education, *Modern VLSI Design*, 3rd Edition, 1997.
4. S.M. SZE, *VLSI Technology*, 2nd Edition, TMH, 2003.

## III B.Tech. II Sem (ECE)-Elective-I

# Data Structures

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**Course Objectives:**

- To develop skills to design and analyze linear and non linear data structures
- To develop algorithms for manipulating linked lists, stacks, queues, trees and graphs
- To develop recursive algorithms as they apply to trees and graphs.

**UNIT-I**

**Introduction:** Concepts of Abstract Data Types (ADTs), Data Structures, primitive and non-primitive data structures, Linear and non-linear data structures. **Arrays:** Definition, single and Multidimensional arrays, Representation of arrays, Application of arrays, **Linked lists:** Representation of linked list in memory, Single inked list, Double linked list, Circular linked list, Operations on a linked list: Insertion, Insertion, Deletion, Traversal, Memory allocation and Garbage collection.

**UNIT-II**

**Stacks:** Abstract Data type, Stack operations: Push, Pop, Full and Empty, Array and linked implementation of stack, Applications of stack: Prefix and postfix expressions, Evaluation of postfix expression, Tower of Hanoi problem, Recursion. **Queues:** Abstract Data Type, Queue operations: Create, Add, Delete, Full and Empty, Array and linked implementation of queue, circular queue, Dequeue and priority queue.

**UNIT-III**

**Trees:** Basic Terminology, **Binary Trees:** Definition, properties, Array and linked representation, complete Binary Tree, Tree Traversal algorithms: Inorder, Preorder and Postorder, Heaps, Balanced Binary search Trees: AVL, Read-Black and splay Trees.

**UNIT-IV**

**Graphs:** Terminolgy, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency list, Adjacency Multilist, Graph Traversal: Depth First search and Breadth First Search, connected components, spanning Trees, Minimum cost Spanning Trees: Prims and Kruskal algorithm and Dijikstra Algorithm.

**UNIT-V**

**Sorting:** Selection, Insertion, Bubble, Merge, Quick, Heap and Radix sorting techniques, **Searching:** Sequential search, Binary search, comparison and Analysis.

## Text Books :

1. Aaron M.Tenenbaum, Yedidyah Langsam and Moshe J.Augestein, " Data Structures using C and C++ " , PHI.
2. Horowitz and Sahani, " Fundamentals of Data Structures", Galgotia publication.

## Reference Books:

1. Jean Paul Trembley and Paul G. Sorenson, " An Introduction to Data Structures with applications", McGraw Hill.
2. G A V Pai, " Data Structures and Algorithms", TMH
3. Lipschutz, " Data Structures", Schaum's Outline series, TMH
4. R. Kruse etal, " Data Structures and Program Design in C", Pearson Education.

## III B.Tech. II Sem (ECE)-Elective-I

# Computer Networks

## Course Objectives:

1. To give the concepts of various network reference models and their layers
2. To introduce cryptography

**UNIT-I**

**Types of Networks**: Reference Models-OSI reference model, TCP/IP reference model, OSI vs TCP. Network hardware architecture topologies, devices, Introduction to types of networks-optical networks, sensor networks

**UNIT-II**

**Physical Layer**: Transmission media, Guided and Unguided transmission media, communication Satellites.

**Data Link layer**: Design Issues, Error detection and Correction, Elementary and sliding window Data link protocols

**UNIT-III**

**MAC & Network layers:** Media Access Protocols, carrier senses multiple access, collision free protocols, Ethernet, Wireless LANs-Types.

**Network layer:** Network Layer design issues- Routing Algorithms, IPV4 and IPV6 protocols.

**UNIT-IV**

**Transport Layer:** Transport services, Elements of Transport protocols, simple Transport protocols-UDP-TCP- performance Issues.

**UNIT-V**

**Application Layer:** DNS, E-mail, WWW, multimedia.

**Introduction to Cryptography**: Basic concepts, firewalls.

## Text Books:

1. Andrew S. Tanenbaum , "Computer Networks ", Fourth Edition, Pearson Education.
2. S. Keshav, "An Engineering Approach to Computer Networks", International Student Edition, Addisson Wesley.

## Reference Books:

1. Behrouz A.Forouzan " Data communication and Networking", Tata McGraw-Hill,2004
2. James F.Kurose and Keith W.Ross," Computer Networking: A Top-Down approach featuring the Internet", Pearson Education,Third Edition 2003.

## III B.Tech. II Sem (ECE)-Elective-I

# Database Management Systems

## Objectives:

1. **Introduction to relational model and SQL**
2. **To make students learn the various concepts related to the RDBMS**

**UNIT-I**

**Introduction:** Database-System Applications, Purpose of Database Systems, View of Data, Database languages, Database Users and Administrators, History of Database Systems.

**Introduction to the Relational Model** - Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Database Design and the E-R Model - Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling Data.

**UNIT-II**

**Introduction to SQL:** Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database .

**Intermediate SQL:** Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization

**Advanced SQL:** Functions and Procedures, Triggers.

**Formal Relational Query Languages:** The Relational Algebra, the Tuple Relational Calculus, the Domain Relational Calculus.

**UNIT-III**

**Schema Refinement and Normal Forms:** Schema Refinement – Problems Caused by Redundancy, Decompositions, Problems related to decomposition. Reasoning about Functional Dependencies, First, Second, Third Normal forms, BCNF. Lossless join Decomposition, Dependency-preserving Decomposition. Schema refinement in Data base Design, Multi valued Dependencies, Fourth Normal Form, Join Dependencies, Fifth Normal Form, Inclusion Dependencies.

**UNIT-IV**

**Query Processing:** Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions

**Query Optimization:** Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans.

**Transactions:** Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

**UNIT-V**

**Concurrency Control:** Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multi version Schemes, Snapshot Isolation, Insert Operations, Delete Operations, and Predicate Reads, Weak Levels of Consistency in Practice.

**Recovery System:** Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations, Remote Backup Systems.

## Text Books:

1. Silberschatz, Korth, *Database system Concepts*. 5th Edition, McGrawhill.
2. Raghurama Krishnan, Johannes Gehrke, *Data base Management Systems. 3rd Edition*,Tata McGrawHill.

## Reference Books:

1. Elmasri, Navathe, *Fundamentals of Database Systems*, Pearson Education.
2. Peter Rob, Ananda Rao and Carlos Corone, *Database Management Systems*, Cengage Learning.
3. C.J.Date, *Introduction to Database Systems*, Pearson Education.

**III B.Tech. II Sem. (ECE)**

# Communication Engineering Lab

## Course Objectives:

- Design and generation of AM,PM, FM,ASK,PSK, QPSK communication techniques
- Usage of Communications test equipment.

## Part- A: Analog Communication Lab:

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Characteristics of Mixer.
4. Pre-emphasis & de-emphasis.
5. Pulse Amplitude Modulation and demodulation.
6. Pulse Width Modulation and demodulation.
7. Pulse Position Modulation and demodulation.
8. Radio Receiver measurements – Sensitivity, Selectivity, & Fidelity.

## Part- B: Digital Communication Lab:

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse Code Modulation.
4. Delta modulation.
5. Frequency shift keying - Modulation and Demodulation.
6. Phase shift keying - Modulation and Demodulation.
7. Differential phase shift keying - Modulation and Demodulation.
8. QPSK - Modulation and Demodulation.

**III B.Tech. II Sem. (ECE)**

# Linear and Digital IC Applications Lab

## Part A: IC Application Lab:

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order).
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.
8. Precision Diodes

## Part B: Electronic Circuits Analysis and Design (ECAD) :

## Simulate the internal structure of the following Digital IC's using VHDL:

1. Logic Gates- 74XX.
2. Half Adder, Half Subtractor, Full Adder, Full Subtractor & Ripple
3. Carry Adder.
4. 3-8 Decoder -74138 & 8-3 Encoder- 74X148.
5. 8 x 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
6. 4 bit Comparator-74X85.
7. D Flip-Flop 74X74.
8. JK Flip-Flop 74X109.
9. Decade counter-74X90.

**IV B.Tech. I Sem. (ECE)**

# Management Science
## (Common to All Branches)

## Course Objectives:

- Provide a basic understanding of management science including analytical problem solving and communications skills.
- Prepare for practice in a field that sees rapid changes in tools, problems and opportunities.
- Prepare for graduate study and self-development over an entire career.
- Provide ability to use the techniques, skills and modern engineering tools necessary for engineering practices.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Background necessary for admission to top professional graduate engineering or business programs.

**UNIT- I**

**Introduction to Mangement:** Concept of Management-Administration, Organization-Function of Management, Evolution of Management Thought-Organization: Principles of Organisation-Types-Organisation charts-managerial objectives and Social responsibilities of Management.

**UNIT – II**

**Strategic Amnagement:** Corporate Planning-mission, objectives and programmes-SWOT Analysis-Strategy Formulation and Implementation.-Plant location and Plant Layout concepts-Production control.

**UNIT – III**

**HRM and Inventory Management:** Human Resource Management –Manpower Planning-Personnel Management-Basic functions of Personnel Management, Job Evaluation and Merit Rating-Incentive plans.

**Inventory Management**: Need for Inventory Control; EOQ,ABC Analysis, Purchase Procedure, Maintaining Store Records.

**UNIT-IV**

**Operarions Management:** Productivity- Job, Batch and Mass Production-Work Study-Basic procedure involved in Method Study and Work Measurement. Statistical Quality Control-c chart, p chart, R chart, Acceptance sampling Deming's contribution to Quality.

**UNIT-V**

**Project Management:** Network Analysis to project management- PERT/CPM- Application of network techniques to engineering problems-Cost Analysis-Project Crashing.

## Text Books:

1. Aryasri: Management Science,TMH,2008.

## Reference Books:

1. Koontz& Weihrich:Essentials of Management,6/e,TMH,2005
2. Kanishka Bedi:Production and Oerations Management,Oxford University Press,2004
3 .Parnell:Strategic Management,Biztantra,2003.
4. LS Srinath: PERT/CPM,Affiliated East-West Press,2005

**IV B.Tech. I Sem. (ECE)**

# Microcontrollers and Applications

## Course Objectives:

- To become familiar with 8051, PIC, ARM Microcontroller Architecture, Instructions, Programming.
- To use 8051 microprocessor for various applications.

**UNIT I**

**The 8051 Architecture:** Introduction, architecture of 8051, pin diagram, memory organization, external memory interfacing, stack, addressing modes, instruction set.

**UNIT II**

**The 8051 Programming:** Assembler directives, Assembly Language programs and Time delay Calculations.

**8051 Interrupts and Timers/Counters:** 8051 interrupt structure, 8051 counters and Timers, programming 8051 timers.

**UNIT III**

**8051 Interfacing and Applications:** Basics of I/O Concepts, I/O port operation, Interfacing 8051 to LCD, keyboard, parallel and serial communication, ADC, DAC, Stepper motor, DC motor Interfacing and Programming.

**UNIT IV**

**PIC Microcontrollers:** Overview and Features, Architecture Details of PIC 16C6X/7X, Instructions, Addressing modes, I/O Ports, Interrupts, Timer, ADC. Features of 16F8XX series.

**UNIT V**

**ARM 32 Bit MCUs :** Introduction to 16/32 Bit processors – ARM architecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set – Development tools.

## Text Books:

1. Embedded Systems Architecture, Programming and Design- Raj Kamal, Second Edition, McGraw-Hill Companies.

2. Mazidi Muhammad Ali, Mazidi Janice Gillespie & McKinlay Rolin D, *The 8051Microcontroller and Embedded Systems*, 2nd Edition, Pearson Education, 2008.

## Reference Books:

1. Microcontrollers Architecture, Programming, Interfacing and System Design – Raj Kamal, Pearson Education, 2005.
2. Design with PIC Microcontrollers – John B. Peatman, Pearson Education, 2005.
3. PIC MANUAL
4. ARM MANUAL.

**IV B.Tech. I Sem. (ECE)**

# Electronic Measurements and Instrumentation

## Course Objectives:

- The presentation of fundamental measurement concepts and measurement methodologies including the description of basic instruments that are the technological implementation of general methodologies.
- Understanding about the transducers and to help the students analyze various signals using CRO.

**UNIT I**

**Performance characteristics of Instruments:** Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error.

**Voltmeters:** DC Voltimeters- Multirange, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multimeter for Voltage, Current and resistance measurements.

**UNIT II**

**Signal Generator:** Fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform.

**Wave Analyzers:** Haromonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

**UNIT III**

**Oscilloscopes:** CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Measurement of amplitude and frequency.

**UNIT IV**

**Special osclloscopes:** Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type, Frequency counter, Time and Period measurement.

**UNIT V**

**AC Bridges:** Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance -Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

**Transducers:** Active & passive transducers **,** Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors. Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

## Text Books:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

## References:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI (OUP), 2nd Edition, 2003.

2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.
3. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005

**IV B.Tech. I Sem. (ECE)**

# Optical Communications

**UNIT-I**

Introduction and Optical fiber waveguides: Historical Development, The General System, Advantages of Optical Fiber Communications, Ray Theory transmission, Electromagnetic mode theory for Optical Propagation, Cylindrical Fiber, Single mode fibers.

**UNIT-II**

Fiber Materials - Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic Cables. Attenuation, Material Absorption Losses in Silica Glass Fibers, Linear Scattering Losses, Fiber Bend Loss, Dispersion, Chromatic dispersion, Intermodal dispersion, Overall fiber dispersion, Polarization.

**UNIT-III**

Fiber alignment and joint loss, fiber-to-fiber Joints, Fiber Splices, Fiber Connectors, Fiber Couplers, Optical Isolators and Circulators.

Light Emitting Diodes (LEDs): LED Structures, Light Source Materials, Quantum efficiency and LED Power, Modulation of LED. LASER Diodes- Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies, Resonant Frequencies.

**UNIT-IV**

Power launching and Coupling: Source to Fiber Power Launching, Lensing schemes for Coupling Improvement, LED coupling to single mode fibers.

Photo Detectors: Physical principles of photo diodes, photo detector noise, detector response time, avalanche multiplication noise, structures for InGaAs APDs, temperature effect on avalanche gain, comparisons of photo detectors.

**UNIT-V**

Digital Links: Point to point links, power penalties, Analog links: Over-view of analog links, carrier to noise ratio, multichannel transmission techniques.

WDM Concepts and components: Over-view, Isolators & circulators, Fiber grating filters, dielectric thin film filters, Diffraction gratings, Active optical components.

## Text Books:

1. Optical fiber communications- Gerd keiser, McGraw Hill International Edition, 4th Edition, 2010.
2. Optical fiber communications-John M. Senior, PHI, 3rd Edition, 2010.

## Reference Books:

1. Principles and Applications of Optical Communications, Max Ming-Kang Liu, TMH, 2010.
2. Text book on optical fiber communication and its applications-S.C.Gupta, PHI, 2005.
3. Fundamentals of Optical Fiber communications, Satish Kumar, PHI, 2009.

**IV B.Tech. I Sem. (ECE) Elective-II**

# RADAR Systems

## Course Objectives:

- The objective of the course is to acquaint the knowledge about radar subsystems, their performance and key functions.
- This course also provides the in depth knowledge and issues related various tracking radars

**UNIT-I**

**Fundamentals:** Radar block diagram and operation, Radar frequencies, simple form of radar equation, Minimum detectable signal, Receiver noise and S/N ratio, Probability density functions, Integration of Radar pulses, Radar cross-Section of targets, PRF.

**UNIT-II**

**Radar components:** RF amplifier, TWT, CFA, Modulators, Mixers-Conversion loss, Noise figure, Types of Mixers, Duplexers-Branch type, Balanced and Solid state Duplexers, Displays-CRT displays, A, B, C, E-scopes, PPI, RHI.

**UNIT-III**

**Radar systems**: CW radar, FMCW radar, Multiple frequency C.W radar, MTI radar-Delay line cancellers, Pulse repetition frequencies, range gated Doppler filters, tracking radar- Range and angle tracking, Sequential lobbing and Conical scanning,

**UNIT-IV**

**Radio direction finding and ranging**: The loop antenna, the goniometer, errors in direction finding, The LF/MF four course radio ranges, VHF-VOR, VOR receiving equipment.

**UNIT-V**

**Hyperbolic systems of navigation &DME:** Loran-A, Loran-C, Decca navigation system, Decca receivers, DME-operation, TACAN&TACAN equipment.

## Text Books:

1. Merrill I.Skolnik, “Introduction to Radar Systems”, 2nd edition-TMH 1980.
2. N.S. Nagaraja, “Elements of electronic navigation, 2nd edition-TMH 1996.

## IV B.Tech. I Sem. (ECE) Elective- II

# Speech processing

**Course Objectives**:

- This course seeks to familiarize students with Fundamental concepts of speech production and speech perception
- Mathematical foundations of signal processing and pattern recognition, Computational methods for speech analysis, recognition, synthesis, and modification

**UNIT-I**

**The Speech Production mechanism:** Physiological and Mathematical Model, Relating the physiological and mathematical model, Categorization of Speech Sounds based on the source-system and the articulatory model.

**UNIT- II**

**Basic Speech Signal Processing Concepts**: Discrete time speech signals, relevant properties of the fast Fourier transform and Z-transform for speech recognition, convolution, linear and non linear filter banks,

Spectral estimation of speech using the Discrete Fourier transform, Pole-zero modeling of speech and linear prediction (LP) analysis of speech, Homomorphic speech signal deconvolution, real and complex cepstrum, application of cepstral analysis to speech signals.

**UNIT-III**

**The Speech Recognition Front End**: Feature extraction for speech recognition, Static and dynamic features for speech recognition, robustness issues, discrimination in the feature space, feature selection.Mel frequency cepstral co-efficients (MFCC), Linear prediction cepstral coefficients (LPCC), Perceptual LPCC.

**UNIT-IV**

**Distance measures for comparing speech patterns**: Log spectral distance, cepstral distances, weighted cepstral distances, distances for linear and warped scales, Dynamic Time Warping for Isolated Word Recognition.

**UNIT-V**

**Statistical models for speech recognition:** Vector quantization models and applications in speaker recognition, Gaussian mixture modeling for speaker and speech recognition, Discrete and Continuous Hidden Markov modeling for isolated word and continuous speech recognition.

## Text books:

1. Discrete-Time Speech Signal Processing: Principles and Practice, Thomas F. Quatieri, Cloth, 816 pp. ISBN: 013242942X Published: OCT 29, 2001.

2. Fundamentals of Speech Recognition, L. Rabiner and B. Juang, Prentice-Hall SignalProcessing Series, Pages: 507, Year of Publication: 1993, ISBN:0-13-015157-2.

## Reference Books:

1. Speech and Audio Signal Processing: Processing and perception of speech and music B. Gold and N. Morgan, Wiley 2000, ISBN: 0-471-35154-7.
2. Corpus-Based Methods in Language and Speech Processing, Steve Young et. al editors, 234 pages, Kluwer, ISBN 0-7923-4463-4.
3. Discrete Time Processing of Speech Signals, JR Deller, JG Proakis, JH Hansen, Year of Publication: 1993, ISBN:0023283017.
4. Hidden Markov Models for Speech Recognition, XD Huang, Y Ariki, MA Jack, Edinburgh University Press.
5. Digital Processing of Speech Signals, LR Rabiner and RW Schafer, Pearson Education.

**IV B.Tech. I Sem. (ECE) Elective- II**

# Object-Oriented Programming through Java

**UNIT I**

**Overview of programming:** Programming paradigms, Basics of object oriented programming, Brief history of java, Structure of a java program-token comments, identifiers, keywords, literals, input& output mechanisms, Java development and runtime environment setup.

**UNIT II**

**Statements:** Labeled, Expression, Null and Compound Statements, Control statements- Conditional, Unconditional Control Transfers, Loops.

**Arrays:** Declaration, and Creation, Accessing array elements, Initialization and assigning values, Assigning array to another array, Library methods for arrays, Multidimensional arrays, Characters array, passing array to functions.

**UNIT III**

**Methods or functions:** Declaration, definition and a call of method or function, Main method arguments, Reference variables. Method overloading, parameter passing, Recursion, Scope of variables. Return from methods.

**Data abstraction through classes:** class, class and Member modifiers, Constructors, Dynamic memory management, The this keyword, Static members, Scope of variables, interfaces, implementing and Extending, packages, Exception handling.

**UNIT IV**

**Class relationships:** Inheritance, Polymorphism, Object class, controlling access to members of class, Direct and indirect super-classes- Access rights in subclasses and packages, Constructor calling sequence, Multiple inheritance, per class protection, Dynamic binding of methods, Operator instance of Abstract class, Over ridding, Shadowing and Hiding, Finalize, aggregation and composition.

**Multi threading:** processes and threads, Life cycle of a thread. Thread methods, Creating and naming a thread, priority threads, Sleep and joining a thread, Thread synchronization, Thread groups.

**UNIT V**

**Java standard packages and classes:** Java standard packages-java.lang, java.util, java.math; Java classes-String Buffer, StringTokenizer classes, Wrapper classes for primitive types-Date, Calendar, Random classes, Exception class, Assert Statement, Formatter class, Interface collection and collection framework with Vector, ArrayList, LinkedList, Stack, Arrays, Hashtable classes.

**Applets**: Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

## Text Books:

1. Jana D, Java and Object-Oriented Programming paradigm, PHI,2005.
2. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
3. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill.

## Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
3. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O.Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill.
7. "Java in Nutshell", David Flanagan, O.Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

**IV B.Tech. I Sem. (ECE) Elective-III**

# Embedded Real Time Operating Systems

## Course Objectives:

- The main objective of the course is to get students familiar with the typical problems and constraints that arise when designing and developing embedded systems
- The course will also introduce theoretical and practical solutions to these typical problems that the students are expected to master and be able to apply to realistic case studies.

**UNIT I**

**Introduction:** History of Embedded Systems, Major Application Areas of Embedded Systems, Purpose of Embedded Systems, Core of the Embedded System, Sensors and Actuators, Communication Interface, Embedded Firmware.

**Hardware Software Co-Design and Programme Modelling:** Characteristics of an Embedded System, Quality Attributes of Embedded Systems, Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modeling Language (UML),Hardware Software Trade-offs.

**UNIT II**

**Embedded Hardware Design and Development:** Analog Electronic Components, Digital Electronic Components, VLSI and Integrated Circuit Design, Electronic Design Automation (EDA) Tools.

**Real-Time Operating Systems (RTOS) Based Embedded System Design:** Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling :Putting them Altogether, Task Communication, Task Synchronization, Device Drivers, How to Choose an RTOS.

**UNIT III**

**Devices and Communication Buses for Devices Network:** IO Types and Examples, Serial Communication Devices, Parallel Device Ports, Sophisticated Interfacing Features in Device Ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Serial Bus Communication Protocols, Parallel Bus Device Protocols- Parallel Communication Network Using ISA, PCI, PCI-X and Advanced Buses, Internet Enabled Systems- Network Protocols, Wireless and Mobile System Protocols.

**Program Modeling Concepts:** Program Models, DFG Models, state Machine Programming Models for Event-controlled Program Flow, Modeling of Multiprocessor Systems, UML Modeling.

**UNIT IV**

**Real Time Operating Systems:** Process Management, Memory Management, Device, File and IO Subsystems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Real-time Operating Systems, Basic-Design an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Matrices, OS Security Issues.

**UNIT V**

**Design Examples and Case Studies of Progam Modeling and Programming With RTOS-2:** Case study of Communication between Orchestra Robots, Embedded Systems in Automobile, Case study of an Embedded System for an Adaptive Cruise Control(ACC) System in a Car, Case study of an Embedded System for a Smart Card, Case study of a Mobile Phone Software for Key Inputs.

## Text Books:

1. Introduction to Embedded System- Shibu KV, Mc-Graw Hill Higher Edition.
2. Embedded Systems Architecture, Programming and Design- Raj Kamal, Second Edition, McGraw-Hill Companies.
3. Embedded System Design by Peter Marwedel, Springer.

## Referemce Books:

1. Embedded System Design – A Unified Hardware/Software Introduction-Frank Vahid, Tony D. Givargis, John Wiley, 2002.

2. Embedded/ Real Time Systems-KVKK Prasad, Dreamtech Press, 2005.

3. An Embedded Software Primer- David E. Simon, Pearson Ed. 2005.

**IV B.Tech. I Sem. (ECE) Elective- III**

# Neural Networks and Fuzzy Logic

**UNIT-I**

**Biological Neural Networks:** Organization of human brain, Neuron functions, Cell body, Axon, Dendrites, Cell membrane, Computers and human brain.

**Artificial Neural Networks:** Artificial neuron, Mc Culloah-Pitts neuron model, Characteristics, activation functions, Architectures(single layer and multi layer) and applications of ANNs. Training: supervised and unsupervised, Different learning rules.

**Perceptrons:** Perceptron representation, Ex – OR problem, Linear separability, Learning, Training algorithm, Advanced algorithm(Back propagation) and applications.

**UNIT-II**

**Counter Propagation Networks:** Introduction, Network structure, Normal operation, Weight selection, Training Kohenen and Grossberg layers, Full counter propagation network, applications.

**Hopfield Networks**: Recurrent network configurations, Applications

**UNIT-III**

**Statistical Methods:** Training, application, Boltzman training, Back propagation and Cauchy`s training.

**Bidirectional Associative Memories (BAM):** BAM structure, Retrieving a stored association, Encoding association, Memory capability, Types of BAM: Continuous, Adaptive, Competitive.

**Adaptive Resonance Theory**: ART architecture, Implementation, Training example, Characteristics.

**UNIT-IV**

**Introduction To Fuzzy Systems:** Classical (Crisp) sets, Notation, Basic concepts, Fuzzy sets , basic concepts, Properties of fuzzy sets, Fuzzy operations: Compliment, Union, Intersection.

**Fuzzy Relations:** Binary relations review, Equivalence and similarity relations, Compatibility relations, Orderings and Morphisms.

**Fuzzy Measures:** Belief and plausibility measures, Probability, Possibility and necessity measures.

**UNIT-V**

**Adaptive Fuzzy Systems:** Neural and fuzzy machine intelligence, Fuzzyness as multi-variance, Fuzzyness in probabilistic world, randomness Vs ambiguity, Sets as points in cube.

**Fuzzy Associative Memories (FAM):** Fuzzy systems as between cube mappings, Fuzzy and neural function estimators, Neural Vs fuzzy representation of structured knowledge, FAMs as mappings, Fuzzy Hebb FAMS: Bidirectional FAM theorem, Superimposing FAM rules, FAM system architecture.

## Text Books:

1. Philip D. Wasserman, *Neural Computing, Theory and Practice*, Van Nostrand Reinhold.
2. George I. Klir and Tina A. Folger, *Fuzzy Sets, Uncertainty and Information* , PHI
3. Bart Kosko, *Neural Networks and Fuzzy Systems* , PHI.

## Reference Books:

1. Jacek M. Zurada, *Introduction to Artificial Neural Systems*, Jaico Publishing House.
2 . Laurence Fausett, *Fundamentals of Neural Networks, Architectures, Algorithms and Applications*, Pearson Ed.
3. Timothy Ross, *Fuzzy Logic with Engineering Applications*, TMH.
4. Fakhreddine O.Karray, Clarence De Silva, *Soft Computing and Intelligent Systems Design*, Pearson Ed.

**IV B.Tech. I Sem. (ECE) Elective- III**

# Data Communications

## Course Objectives:

- Main objective of this course is to provide insight about the data communication and networks.
- Students are able to learn Digital multiplexing techniques and its hierarchy.
- To make familiarize wireless communications and cellular telephone systems.
- To familiarize the design of BCH, Convolution codes both encoding and decoding.

**UNIT I**

**Introduction to Data Communications and Networking:** Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Circuit Arrangements.

**Metallic Cable Transmission Media**: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves, Transmission Line Classifications, Metallic Transmission Line Types, Metallic Transmission Line Equivalent Circuit, Wave Propagation on Metallic Transmission Lines, Metallic Transmission Line Losses.

**UNIT II**

**Multiplexing and T Carriers:** Time- Division Multiplexing, T1 Digital Carrier System, North American Digital Multiplexing Hierarchy, Digital Line Encoding, T Carrier systems, European Time-Division Multiplexing, Statistical Time – Division Multiplexing, Frame Synchronization, Frequency-Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

**UNIT III**

**Wirless Communications Systems:** Electromagnetic Polarization, Rays and Wavefronts, Electromagnetic Radiation, Spherical Wavefront and the Inverse Square Law, wave Attenuation and Absorption, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

**Cellular Telephone Systems:** Concepts – Frequency reuse- Cell splitting – Network components – Call Processing - First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Global system for Mobile Communications.

**UNIT IV**

**Telephone Instruments and Signals:** The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

**The Telephone Circuit:** The Local Subscriber Loop, Telephone Message- Channel Noise and Noise Weighting, Units of Powers Measurement, Transmission Parameters and Private-Line Circuits, Voice-Frequency Circuit Arrangements, Crosstalk.

**UNIT V**

**Data Communications Codes, Error Control, and Data Formats:** Data Communications Character Codes, Bar Codes, Error Control, Error Detection, Error Correction, Character Synchronization.

**Data Communications Equipment:** Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice- Band Modern Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, ITU-T Voice- Band Modem Specifications, 56K Modems, Modem Control: The AT Command Set, Cable Modems, Probability of Error and Bit Error Rate.

## Text Books:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

## Reference Books:

1. Data Communications and Networking, Behrouz A Forouzan, 4th Edition, TMH.
2. Computer Communications and Networking Technologies, Gallow, 2nd edition, Thomson.
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, 5th Edition, Pearson Edu. Society

**IV B.Tech. I Sem. (ECE)**

# Microwave & Optical Communications Lab

## Course Objectives:

- To provide knowledge on various types of waveguides.
- To find the S-matrix of different Junctions and to obtain Gun Diode and RKO characteristics.
- To find numerical aperture and bending losses of given optical fiber.

## Part – A (Any 7 Experiments):

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.

## Part – B (Any 5 Experiments):

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of NA.
6. Measurement of losses for Analog Optical link.
7. Radiation Pattern Measurement of Antennas (at least two antennas).

**IV B.Tech. I Sem. (ECE)**

# Microprocessors & DSP lab

## Course Objectives:

- To design new algorithms for the implementation of a digital system.
- To understand the MATLAB simulation of various DSP concepts and filter design.

- Designing various programs to verify processors operating style.
- Learning interfacing of processor with various Peripherals.

## I. Microprocessor 8086 & Microcontroller 8051: **(Any four from 1 – 6, and 7, 8 are compulsory)**

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.

2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.

3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

4. Reading and Writing on a parallel port.

5. Timer in different modes.

6. Serial communication implementation.

7. 8259 – Interrupt Controller: Generate an interrupt using 8259 timer.

8. 8279 – Keyboard Display: Write a small program to display a string of characters.

## II. DSP Processor: (Any six of the following)

1. To study the architecture of DSP chips – TMS 320C 5X/6X

2. Instructions.

3. To verify linear convolution.

4. To verify the circular convolution.

5. To design FIR filter (LP/HP) using windowing technique

    a) Using rectangular window

    b) Using triangular window

    c) Using Kaiser window

6. To Implement IIR filter (LP/HP) on DSP Processors.

7. N-point FFT algorithm.

## IV B.Tech. II Sem. (ECE)

# Cellular & Mobile Communications

## Course Objectives:

- The main objective of the course is to provide a comprehensive knowledge in the area of mobile communication
- This course provides the overview of Digital mobile telephony and Digital Cellular systems.

**UNIT-I**

**Cellular and Mobile Radio Systems**: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems

**Elements of Cellular Radio System Design:** General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, Cell splitting, consideration of the components of Cellular system

**UNIT-II**

**Interference:** Introduction to Co-Channel Interference, real time Co-Channel interference, design of Antenna system, Antenna parameters and their effects, diversity receiver.

**Cell Site and Mobile Antennas**: Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

**UNIT-III**

**Cell Coverage for Signal and Traffic:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

**UNIT-IV**

**Frequency Management and Channel Assignment:** Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

**Handoffs:** Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

**UNIT-V**

**Digital Cellular and Mobile Networks**: GSM architecture, GSM channels, multiple access scheme, TDMA, CDMA.

## Text Books:

1. Mobile Cellular Telecommunications, W.C.Y. Lee, McGraw Hill, 2nd Ed, 1989.
2. Wireless Communications, T.S Rappaport, Pearson Ed., 2nd Ed., 2002.

## Reference Books:

1. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.
2. Wireless Communication and Networking, Jon W. Mark and Zhqung, PHI, 2005.
3. Cellular & Mobile Communications – Lee, Mc Graw Hill.

**IV B.Tech. II Sem. (ECE)**

# Digital Image Processing

## Course Objectives:

- The objectives of this course are for students to learn the fundamental theories and techniques of digital image processing.

**UNIT-I**

**Fundamentals of Image Processing**: fundamental Steps in Digital Image Processing, Components of an Image processing system, elements of Visual Perception. Image Acquisition, Image Model, Sampling, Quantization, Relationship between pixels, distance measures, connectivity, Linear and Nonlinear Operations.

**UNIT-II**

**Image Transforms:** 2-D DFT, Properties, Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform

**UNIT-III**

**Image Enhancement:** Image enhancement in Spatial domain**,** Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Basics of Spatial filtering Image enhancement in the Frequency Domain filters, Smoothing Frequency Domain filters, Sharpening Frequency Domain filters, homomorphic filters. Color image processing, Color fundamentals, color models.

**UNIT-IV**

**Image Compression:** Redundancies for image compression, Fidelity criteria, Image compression models, Source encoder and decoder Huffman Coding, Arithmetic coding, Bit-plane coding, loss less and lossy predictive coding. Transform coding techniques: Zonal coding and Threshold coding. Brief discussion on Image Compression standards.

**UNIT-V**

**Image Segmentation:** Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation.

**Image Restoration:** Degradation model, Algebraic approach to restoration, Linear Position-Invariant Degradations, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

## Text Books:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson Ed., 2nd Edition, 2002.
2. Fundamentals of Digital Image processing – A.K.Jain, Prentice Hall of India.

## Reference Books:

1. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
2. Digital Image Processing – William K. Pratt, John Wiley, 3rd Edition, 2004.

**IV B.Tech. II Sem. (ECE)**

# Satellite Communications

## Course Objectives:

- To give familiarity with Satellite communications, Spread Spectrum techniques.
- Make to understand Satellite link design and Satellite multiple access techniques.
- To understand Satellite subsystems.

**UNIT I**

**Introduction:** The origin of satellite communication , a brief history of satellite communications, the current state of satellite communications

**Orbital Aspects of satellite communications**: Orbital , mechanics, look angle determination ,orbital perturbation ,Orbital determination , Launches and launch vehicles, Orbital effects in communication system performance.

**UNIT II**

**Space Craft:** Introduction , space craft sub system, attitude and orbit control system, telemetry ,tracking and command , power systems, communication sub systems, space craft antennas.

**UNIT III**

**Satellite link design:** Basic transmission theory , system noise temperature and G/T ratio, design of down links, up link design ,design of satellite links for specified C/N.

**UNIT IV**

**Multiple Access:** Frequency division multiple access (FDMA), Single and Multiple channel per carrier, FDM/FM/FDMA link ,Time division Multiple access (TDMA), TDMA frame structure and frame efficiency, TDMA super frame structure, Frame acquisition and synchronization, Code Division Multiple access(CDMA), PN sequence,Direct sequence and Frequency hopped spread spectrum system, Demand assignment multiple access, Demand assignment TDMA, SCPC-DAMA, SPADE.

**UNIT V**

**Earth Station Technology:** Earth Station Design , Design of large Antennas , Tracking , Small Earth Station Antennas, Equipment for Earth Stations.

## Text Books:

1. Satellite Communication - by Pratt, John Wiley.
2. Satellite Communication - by Robert M.Giglardi, CBS Publ
3. Satellite Communication -by Agarwal

**IV B.Tech. II Sem. (ECE) Elective-IV**

# Data Acquisition Systems

## UNIT-I

Data Measurement : Transducers – measurement of displacement – measurement of acceleration and vibration : Seismic accelerometer, piezo-electric accelerometer, vibration transducers, feedback transducers – measurement of angular velocities – Fluid flow measurements – Light transducers – acoustic transducers.

## UNIT-II

Pre Processing : Signal amplification : - Instrumentation amplifiers, Capacitive amplifiers, the charge – compensating amplifier, the sample – and – hold amplifier. Filters : Analog active filters, software digital filters, hard ware digital filters – Decimation – Calibration methods.

## UNIT-III

Data Acquisition : INK – ON – PAPER Recording : pen recorders, 'penless' chart recording, potentiometric recorders, the X – Y plotter – Analog Instrumentation Tape recording : Direct recording, FM recording, Magnetic recording – Digital recording and storage. Tape recording, disc and drum recording, Digital recording methods.

## UNIT-IV

Digitisation : Sampling & quantization – A/D Converters picture digitisation.
Data Acquisition Systems : Data display systems – Data recording systems – Data processing systems – Integrated data systems – Microprocessors in data acquisition systems.

## UNIT-V

Remote Data Acquisition : Passive remote sensing – Active remote sensing – telemetry.
Multiplexers : Multiplexers & Concentrators – Statistical multiplexers.

**Text Books:**

1. K.G.Beauchamp & C.K.Yuen, 'Data Acquisition for signal Analysis, Allen & Unwin Ltd, London (1980).
2. Trevor Housley, 'Data communications and Teleprocessing systems' – PHI – 2nd Edn.

**IV B.Tech. II Sem. (ECE) Elective- IV**

# Spread Spectrum Communications

## Course Objectives:

- To make familiarize the Spread Spectrum communications and various modulation schemes.
- To learn the spread spectrum signals generation and detection.

**UNIT-I**

**Fundamentals of Spread Spectrum:** General concepts, Direct sequence (DS), Pseudo Noise (PN), Frequency Hopping, Time Hopping, Comparison of Modulation methods, Hybrid Spread spectrum systems, Chirp spread spectrum, Baseband modulation techniques.

**Analysis of Direct Sequence Spread Spectrum Systems:** Properties of PN sequences, Classes of periodic sequences, Properties of m sequences, Partial Co–relation, PN signal from PN sequences, Partial co – relation of PN signals, The PN Signal, De-spreading the PN signal, Interference rejection, Output signal to noise ratio, Antijam characteristics, Interception, Energy bandwidth efficiency.

**UNIT-II**

**Analysis of Avoidance – Type Spread Spectrum Systems:** The frequency hopped signal, Interference rejection in a frequency hopping receiver, the time hopped signal.

**Generation of Spread Spectrum Signals:** Shift register sequence generators, Discrete frequency synthesizers, SAW device PN generators, Charge coupled devices, Digital tapped delay lines.

**UNIT-III**

**Detection of Spread Spectrum Signals -Tracking:** Coherent direct sequence receivers, other method of carrier tracking, Delay lock loop analysis, Tau – Dither loop, Coherent carrier tracking, Non coherent frequency hop receiver.

**Detection of Spread Spectrum Signals - Aquisition:** Acquisition of spread spectrum signals, Acquisition cell by cell searching, Reduction of acquisition time, Acquisition with matched filters, Matched filters for PN sequences, Matched filters for frequency hopped signals, Matched filters with acquisition - aiding waveform.

**UNIT-IV**

**Application of Spread Spectrum to Communications:** General capabilities of spread spectrum, Multiple access considerations, Energy and bandwidth efficiency in multiple access, Selective calling and Identification, Antijam considerations, Error correction coding, Intercept consideration (AI), Miscellaneous considerations, Examples of
spread spectrum systems.

**UNIT-V**

**Code Division Multiple Access Digital Cellular Systems:** Introduction, Cellular radio concept, CDMA Digital cellular systems, Specific examples of CDMA digital cellular systems.

## Text Books:

1. George. R. Cooper and Clare D. McGillem, ―Modren Communications and Spread Spectrum‖, McGraw hill Book Company.
2. Roger L. Peterson, Rodger E. Ziemer & David E. Borth,

**IV B.Tech. II Sem. (ECE) Elective- IV**

# Bio-Medical Instrumentation

## Course Objectives:

- To learn the physiology of the human body and the Instrumentation related to Biomedical Systems.

**UNIT I**

**Components of Medical Instrumentation System:** Bioamplifier. Static and dynamic characteristics of medical instruments. Biosignals and characteristics. Problems encountered with measurements from human beings.

**UNIT II**

**Organisation of cell:** Derivation of Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuro-muscular junction.

**UNIT III**

**Bio Electrodes:** Biopotential Electrodes-External electrodes, Internal Electrodes. Biochemical Electrodes.Mechanical function, Electrical Conduction system of the heart. Cardiac cycle. Relation between electrical and mechanical activities of the heart. Pacemaker, Defibrillator

**UNIT IV**

**Cardiac Instrumentation Blood pressure and Blood flow measurement:** Specification of ECG machine.Einthoven triangle, Standard 12-lead configurations, Interpretation of ECG waveform with respect to electromechanical activity of the heart. Therapeutic equipment. Shortwave diathermy. Hemodialysis machine.

**UNIT V**

**Neuro-Muscular Instrumentation Specification of EEG and EMG machines:**
Electrode placement for EEG and EMG recording. Intrepretation of EEG and EMG.
Respiratory Instrumentation Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

## Text Books:

1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.
2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998.

## Reference Books:

1. Principles of Applied Biomedical Instrumentation – L.A. Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 1968.

# List of other subjects to non-branches, to be approved by ECE BOS

## Branch: EEE

## List of Subjects offered to EEE students from ECE Department

### Theory Subjects:

1. Electronic Devices & Circuits (Common for ECE & EEE. Refer to ECE Syllabus)
2. Switchig theory & Logic Design (Common for ECE & EEE. Refer to ECE Syllabus)
3. Analog Electronioc Circuits (Only for EEE. Refer to syllabi given below)
4. Linear & Digital IC Applications (Only for EEE. Refer to syllabi given below)
5. Microprocessors & Micro Controllers (Only for EEE. Refer to syllabi given below)
6. Digital Signal Processing (Common for ECE & EEE. Refer to ECE Syllabus)

## Labs:

1. Electronic Devices & Circuits Lab (Common for ECE & EEE. Refer to ECE Syllabus)
2. Microprocessors & Micro controllers Lab (Only for EEE. Refer to syllabi given below)

**II B.Tech. I Sem. (EEE)**

## Analog Electronic Circuits

**(For EEE branch only)**

**UNIT I**

**SMALL SIGNAL ANALYSIS OF AMPLIFIERS (BJT & FET):** BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Millers Theorem, Dual of Millers Theorem. Small Signal Model of JFET & MOSFET , Small signal analysis of Common Source, and Common Drain Amplifiers using FET, Illustrative problems.

**UNIT II**

**MULTISTAGE AMPLIFIERS:** BJT and FET RC Coupled Amplifiers – Frequency Response. Cascaded Amplifiers. Calculation of Band Width of Single and Multistage Amplifiers. Concept of Gain Bandwidth Product.

**UNIT III**

**FEEDBACK AMPLIFIERS:** Concept of Feedback Amplifiers – Effect of Negative feedback on the amplifier Characteristics. Four Feedback Amplifier Topologies.

**SINUSOIDAL OSCILLATORS:** Condition for oscillations –LC Oscillators – Hartley, Colpitts, – Frequency and amplitude Stability of Oscillators – Crystal Oscillators – RC Oscillators -- RC Phase Shift and Weinbridge Oscillators.

**UNIT IV**

**LARGE SIGNAL AMPLIFIERS:** Class A power Amplifier, Maximum Value of Efficiency of Class A Amplifier, Transformer coupled amplifier – Push-Pull Amplifier – Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier) – Phase Inverters, Transistor Power Dissipation, Thermal Runaway, Heat Sinks.

**UNIT V**

**LINEAR WAVE SHAPING:** High pass, Low pass RC circuits-response for sinusoidal, Step, Pulse, Square and Ramp inputs, Clippers and Clampers

**MULTI-VIBRATORS:** Analysis of Diode and transistor switching times, Analysis and Design of Bistable, Monosatable and Astable Multi-vibrators, Schmitt trigger Using Transistors.

**Text Books:**

1. Integrated Electronics – Millman and Halkias

2. Pulse, Digital & Switching Waveforms by Jacob Milliman, Harbert Taub and Mothiki S Prakash Rao,

2nd edition 2008, Tata McGraw Hill Companies

**Reference Books:**

1. K.Lal Kishore, "Electronic Circuit Analysis", Second Edition, BSP

2. Electronic Devices and Circuits, G.S.N. Raju, IK International Publications, New Delhi, 2006

3. Electronic Devices and Circuits – Mottershead

4. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2005.

5. David A. Bell, "Solid State Pulse Circuits", 4th edition, 2002 PHI.

**III B.Tech. I Sem. (EEE)**

# Linear and Digital IC Applications

**(For EEE branch only)**

**B.Tech III-II Sem.(EEE)**

**UNIT-I**

**DIFFERENTIAL AMPLIFIER & OP-AMP APPLICATIONS**

Differential amplifier – Characteristics of OP-Amps, integrated circuits -types, classification, package types and temperature ranges, power supplies, OP-Amp Block diagram, ideal and practical OP-Amp specifications, DC and AC characteristics, 741 OP-Amp and its features,Inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, V-I, I-V converters. comparators, Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers.

**UNIT-II**

**TIMERS AND PHASE LOCKED LOOPS:** Introduction to 555 Timer, functional diagram, Monostable and Astable operations , Schmitt Trigger, PLL-Introduction, Block schematic, principles and description of individual blocks,565 PLL, applications.

**UNIT–III**

**UNIPOLAR & BIPOLAR LOGIC FAMILIES:** Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic state electrical behavior, CMOS logic families,Bipolar logic, transistor logic, TTL families, CMOS/TTL interfacing, ECL, Comparison of logic families

**UNIT–IV**

**VHDL:** Design flow.program structure.data types and constants,functios andprocedures, libraries and packages.Structural design elements ,data design elements,behavioral design elements.

**UNIT–V**

**COMBINATIONAL & SEQUENTIAL LOGIC:** Decoders,encoders,multiplexers and demultiplexers code converters,comparators adders & subtractors,,Latches and flip-flops, shift registers ,counters .VHDL modes for the above ICs

**TEXT BOOKS:**

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, 4th edition, PHI, 1987.

2. Digital Design Principles&Practices-john F.Wakerly,PHI/Pearson Education 3rd,2005

3. Digital System Design using VHDL-Charles H.Roth jr Cengage Publications,1st edition

**REFERENCES:**

1. Operational Amplifiers & Linear integrated circuits & applications,James M.Fiore Cengage 2009.

.2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.

3.VHDL primer-J.Bhaskar,pearson Education/PHI,3rd Edition

**II B.Tech. II Sem. (EEE)**

# Microprocessors & Microcontrollers

**(For EEE branch only)**

## Course Objectives:

- To become familiar with 8085 & 8086 Microprocessor Architecture, Instructions, Operating Modes, Programming.
- To use 8086 microprocessor for various applications.
- To study various peripherals for microprocessor based systems.

**UNIT I**

**INTRODUCTION:** Development of microprocessors, Brief introduction to 8085,8086 microprocessor - Architecture, Instruction set, Addressing modes, Interrupt system. Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

**UNIT II**

**ASSEMBLY LANGUAGE PROGRAMMING:** Assembler directives, Assembly language programs (8086) with Assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit manipulation, Programs using look-up tables, Delay subroutines. Stages of software development.

**UNIT III**

**Data transfer schemes :** Synchronous, Asynchronous, Interrupt driven and DMA type schemes, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller(8257) and its interfacing, Programmable Interval Timer (8253) and its interfacing, Programmable Communication Interface(8251 USART) and its interfacing.

**UNIT IV**

**Memory interfacing to 8086** : Interfacing various types of RAM and ROM chips, 8255 PPI and its interfacing, ADC and DAC Interfacing, Data acquisition, Waveform generation, Traffic light controller, Stepper motor control, temperature measurement and control.

**UNIT V**

**8051 Microcontroller** : Architecture, Register set, Instruction set, Interrupt structure, timer and serial port operations, Memory and I/O interfacing, Simple Assembly language programs.

## Text Books:

1. A.K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", TMH.
2. Douglas V. Hall, "Microprocessors and interfacing: Programming and hardware", 2nd edition, Tata McGraw-Hill.
3. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", 2nd Edition, Pernam International / Thomson Publishers, 2005.
4. Ajay V. Deshmukh, "Microcontrollers - theory applications", Tata McGraw-Hill.

## IV B.Tech. I Sem. (EEE)

# Microprocessors & Microcontrollers Lab

**(For EEE branch only)**

**I . Microprocessor 8086:**
Arithmetic operation – Multi byte addition and subtraction,
Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
Modular Program: Procedure, Near and Far implementation, Recursion.
**II. Interfacing**
8259 – Interrrupt Controller.
8279 – Keyboard Disply.
8255 – PPI.
8251 – USART.
**III. Mcrocontroller 8051:**
1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.

# Branch: ME

## Subjects for Mechanical Engineering (ME)

**II B.Tech. - I Sem (Part-A will be checked by EEE BOS)**

**Electrical Engineering and Electronics Engineering**

**PART-A: ELECTRICAL ENGINEERING**

**UNIT - I**

**ELECTRICAL CIRCUITS:** Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

**UNIT - II**

**DC MACHINES :** Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – losses and efficiency testing of D.C.Motors,Three point starter
**TRANSFORMERS** : Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

**UNIT - III**

**AC MACHINES :** Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

**Text Books:**
1. Fundamentals of Electrical and Electronics Engineering by T. Thyagarajan,
5th Edition, SCITECH Publications, 2007.
2. Fundamentals of Electrical Engineering and technology by William D
Stanley,John R. Hackworth, Richard L Jones – Thomson Learning
3. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand &
Co.

**Reference Books:**
1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.

**PART-B: ELECTRONICS ENGINEERING**

**UNIT-IV**

**DIODE AND ITS CHARACTERISTICS:**
PN Junction diode, Symbol, V-I characteristics, Diode Applications, Rectifiers-Half Wave, Full Wave and Bridge Rectifiers (Simple Problems).

**TRANSISTORS**
PNP and NPN Junction Transistor, Transistor as an Amplifier, Single Stage CE Amplifier, Frequency Response of CE Amplifier, Concepts of Feedback Amplifier, Necessary conditions for Oscillators, SCR Characteristics and Applications.

**UNIT-V**

**ELECTONIC INSTRUMENTATION:** Electronic multi meter and digital voltmeter, Integrating volt meter, Successive approximation DVM,
Principles of CRT (Cathode Ray Tube), Deflection Sensitivity, Electrostatic and Magnetic Deflection, Applications of CRO-Voltage, Current and Frequency Measurements.

**Text books:**
1. Electronic devices and circuits – R.L.Boylestad and Louis Nashelsky, 9th Edition, 2006, PEI/PHI.Industrial Electronics by G.K.Mittal-PHI.
2. Modern Electronic Instrumentation and Measurement Techniques-Albert D.Helfrick, WillamD.Cooper.

**Reference Books:**
1. Millman's Electronic Devices and Circuits-J.Millman and C.C.Halkias, Satyabratajit, 2nd Edition, 1998, TMH.
2. Electronic Devices and Circuits-K.Lal Kishore, 2nd Edition, 2005, BSP.

**Question Paper Pattern:** 5 questions to be answered out of 8 questions Each question should not have more than 3 bits.

# Branch: CSE

## Subjects for Computer Sciecnce Engineering (CSE)

## Electronic Devices and Circuits

**(For CSE branch only)**

***Course Objectives:***

- To understand electronic devices, including diodes, bipolar junction transistors and FET
- To study various Op-Amp applications

**UNIT-I**

**Semiconductor Devices:** Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction -Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge

Rectifier, Rectifiers with Filters, Zener Diode- Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

**UNIT-II**

**BJT:** Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between IC, IB and IE. Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications- Transistor as an Amplifier, Transistor as a Switch,.

**UNIT-III**

**Junction Field Effect Transistor (JFET):** Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFETCD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch,
Comparison of BJT and JFET,MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET.

**UNIT – IV**

**Oscillators and Op-Amps:** Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator-Transistor Amplifier Circuits, Feedback Circuits and Oscillator Circuits, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits.

**UNIT-V**

**Operational Amplifiers(Op-Amps)-**Symbol of an Op-Amp, single Input and Dual Input Op-Amps(Differential Amplifier), Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps- Inverting & Non-Inverting Amplifiers, Applications of Op-Amps, summing, Differential, Integrator, differentiator Amplifier.

**Text Books:**

1. Electronic Devices and Circuits – S. Salivahana, N.Suresh Kumar, A. Vallavaraj, 2nd Edition, 2008, TMH.
2. Integrated Electronic - J.Millman and C.C.Halkias , 2nd edition, 1998, TMH.

**Reference Books :**

1. Basic Electrical and Electronics Engineering, M.S.Sukhija, T.K.Nagsarkar, Oxford University Press, 1st Edition, 2012.
2. Basic Electrical and Electronics Engineering, S.K Bhattacharya, Pearson Education, 2012.

## II B. Tech I Sem (CSE) (Part-A will be checked by EEE BOS)

# Electrical & Electronics Engineering Lab

**Course Objective:**

- To get exposed to the basic laws in circuit analysis
- To understand the operation of electrical machines
- To introduce the basic design concepts and conduct experiments on CRO, CDS, FG, half and full wave, Transistor characteristics, Shift registers, Summing and difference amplifiers.

**PART – A ELECTRICAL LAB:**

1. Verification of KCL and KVL.
2. Verification of Superposition Theorem.
3. Verification of Thevenin's Theorem.
4. Verification of Maximum Power Transfer Theorem.

5. Load test on DC shunt motor.
6. OC & SC Test on I-ø Transformer ( Predetermination of efficiency and regulation at given power Factor).

**PART – B**

1. V-I Characteristics of a PN – Junction diode.
2. V-I Characteristics of a Zener diode.
3. Input – output Characteristics of a BJT in CB Configuration.
4. Frequency response of CE amplifier.
5. Load Characteristics of Half wave rectifier with and without filter.
6. Op-amp non- inverting amplifier.

## III B.Tech. I Sem (CSE)

# Microprocessors

**(for CSE branch Only)**

Objectives:

- To learn the architecture and instruction set of 16 bit Microprocessors
- To learn the instruction set of 16 bit microprocessor and solve problems using the same

**UNIT-I**

Development of microprocessors 8086 microprocessors – Architechture, Pin configuration, Instruction set, Addressing modes, Interrupt system.
System timing of 8086 – clock cycle, machine cycle and instruction cycle, timing diagram for simple instructions, generation of delays.

**UNIT-II**

Assembler, Assembler directives, Assembly language programs ( 8086) with Assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit manipulation, programs using look–up tables, stages of software development, modular programming, debugging and documentation.

**UNIT-III**

Data transfer schemes – Synchronous, Asynchronous, Interrupt driven and DMA type schemes, USART (8251) and its interfacing, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller and its interfacing, Data communication standards, RS – 232 Serial interface standard, IEEE – 488 GPIB standard.

**UNIT-IV**

Memory interfacing to 8086 – Interfacing various types of RAM and ROM chips, Address decoding techniques.

Interfacing ADC and DAC to 8086 systems, Data acquisition, Waveform generation, Traffic light controller, Stepper motor control, temperature measurement and control.

**UNIT-V**

Introduction to 80386 and 80486 microprocesssors, different modes of operation – protected mode, virtual mode.
Introduction to Pentium processor – special Pentium registers, Pentium memory management, introduction to the Pentium pro– microprocessor.

**Text Books:**

1. Barry B Brey: The INTEL Microprocessors 8086/8088, 80186/80188/80286, 80386, 80486, Pentium and Pentium processor, Architechture, Programming and Interfacing 4th edition (PHI).
2. Hall Douglas V. Microprocessor and Interfacing TMH.
3. Ram B : Fundamentals of Microprocessors and Micro Computers, Dhanpat Rai & sons.
4. Mukhopadhyay, Microprocessor, Microcomputer and their Applications, Narosa Publishing House.
5. J.Uffembeqe, the 8086/8088 family – Design, Programming and Interfacing, PHI.

**III B.Tech. I Sem (CSE)**

# Microprocessors Lab

**(for CSE branch Only)**

**Course Objectives:**

- To solve various problems using microprocessor kits and assembly language
- To study the interface circuits to microprocessors.

## List of Experiments:

## General Problems

1. Addition and Subtraction of two 8- bit/16 bit numbers
2. Multiplication of two 8-bit & two 16-bit numbers
3. Division of 16-bit by 8-bit and 32-bitby 16-bit number
4. Interchange of two data words using 'xchg' instruction.
5. Interchange of 10-data bytes with another 10-data bytes of another location.
6. Addition of 6 data bytes with 6-data bytes of another location.
7. Counting of 0's and 1's in a given data.
8. Check the given number is logical palindrome or not.
9. Finding the maximum and minimum numbers in a given string of data.
10. Sorting the given numbers in ascending and descending order.
11. Conversion of bcd to hexadecimal number.
12. Multiplication of two 3x3 matrices.

## Interfacing

1. Dual dac interface (waveform generation).
2. Stepper motor control.
3. Display of flags using logic controller.
4. Traffic light controller.