J.N.T.U.H COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMOUS)
B.TECH. FOUR YEAR DEGREE COURSE
(ELECTRONICS AND COMMUNICATION ENGINEERING)
COURSE STRUCTURE

I YEAR **I SEMESTER**

S. No.	Course Type	Course Title	L	T	P	Credits
1	BSC	Mathematics-I	3	1	0	4
2	ESC	Basic Electrical Engineering	3	0	0	3
3	BSC	Chemistry	3	1	0	4
4	HSMC	English	2	0	0	2
5	ESC	Basic Electrical Engineering Lab	0	0	2	1
6	BSC	Chemistry Lab	0	0	3	1.5
7	HSMC	English Language and Communication Skills Lab	0	0	2	1
8	ESC	Engineering Workshop	1	0	3	2.5
		Total	**12**	**02**	**10**	**19**

I YEAR **II SEMESTER**

S. No.	Course Type	Course Title	L	T	P	Credits
1	BSC	Mathematics-II	3	1	0	4
2	BSC	Applied Physics	3	1	0	4
3	ESC	Programming for Problem Solving	3	0	0	3
4	ESC	Engineering Graphics	1	0	4	3
5	BSC	Applied Physics Lab	0	0	3	1.5
6	ESC	Programming for Problem Solving Lab	0	0	3	1.5
		Total	**10**	**02**	**10**	**17**

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II YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PC	Electronic Devices and Circuits	3	1	0	4
2	ESC	Network Analysis & Transmission Lines	3	0	0	3
3	PC	Signals and Systems	3	1	0	4
4	PC	Switching Theory and Logic Design	3	1	0	4
5	ESC	Probability Theory and Stochastic Processes	3	0	0	3
6	PC	Electronic Devices and Circuits Lab	0	0	2	1
7	PC	Digital Logic Design Lab	0	0	2	1
8	PC	Basic Simulation Lab	0	0	2	1
9	Aud	Environmental Science	2	0	0	0
		Total	**17**	**03**	**06**	**21**

II YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	BSC	Mathematics-III	3	1	0	4
2	PC	Electromagnetic Fields and Waves	3	0	0	3
3	PC	Analog and Digital Communications	3	1	0	4
4	PC	Linear and Digital Integrated Circuits	3	0	0	3
5	PC	Analog and Pulse Circuits	3	1	0	4
6	PC	Analog and Digital Communications Lab	0	0	2	1
7	PC	Linear and Digital Integrated Circuits Lab	0	0	2	1
8	PC	Analog and Pulse Circuits Lab	0	0	2	1
9	Aud	Gender Sensitization	2	0	0	0
		Total	17	**03**	**06**	**21**

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COURSE STRUCTURE

III YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	HSMC	Business Economics & Financial Analysis	3	0	0	3
2	PC	Microprocessors and Controllers	3	1	0	4
3	PC	Computer Networks	3	1	0	4
4	ESC	Control Systems	3	1	0	4
5	PE 1	Professional Elective - 1	3	0	0	3
6	PC	Microprocessors and Controllers Lab	0	0	3	1.5
7	PC	Computer Networks Lab	0	0	3	1.5
8	HSMC	Advanced English Language and Communication Skills Lab	0	0	2	1
9	Aud	Audit Course	2	0	0	0
		Total	**17**	**03**	**08**	**22**

III YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PC	Antennas and Propagation	3	1	0	4
2	PC	Digital Signal Processing	3	1	0	4
3	PC	VLSI Design	3	1	0	4
4	PE 2	Professional Elective - 2	3	0	0	3
5	OE 1	Open Elective - 1	3	0	0	3
6	PC	Digital Signal Processing Lab	0	0	3	1.5
7	PC	VLSI Design Lab	0	0	3	1.5
8	PC	Advanced Communications Lab	0	0	2	1
	Aud	Audit Course	2	0	0	0
		Total	**17**	**03**	**08**	**22**

Summer between III & IV Year: Industry Oriented Mini Project

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COURSE STRUCTURE

IV YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PC	Microwave Engineering	2	0	0	2
2	PE 3	Professional Elective - 3	3	0	0	3
3	PE 4	Professional Elective - 4	3	0	0	3
4	OE 2	Open Elective - 2	3	0	0	3
5	PC	Microwave Engineering Lab	0	0	2	1
6	HSMC	Management Fundamentals for Engineers	3	0	0	3
7	Project	Project Phase - 1	0	0	6	3
8	Project	Mini Project	-	-	-	2
9	Project	Seminar	0	0	2	1
		Total	**14**	**00**	**10**	**21**

IV YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PE 5	Professional Elective - 5	3	0	0	3
2	PE 6	Professional Elective - 6	3	0	0	3
3	OE 3	Open Elective - 3	3	0	0	3
4	Project	Project Phase - 2	0	0	16	8
		Total	**09**	**00**	**16**	**17**

Professional Elective – 1

1. Operating Systems
2. OOPS through Java
3. Data Analytics

Professional Elective - 2

1. Cellular and Mobile Communications
2. Bio-Medical Electronics
3. Information Theory and Coding

Professional Elective - 3

1. Digital Image Processing
2. Speech Processing
3. Scripting Languages

Professional Elective - 4

1. Network Security and Cryptography
2. Artificial Neural Networks
3. Electronic Measurements and Instrumentation

Professional Elective - 5

1. Radar Systems
2. EMI & EMC
3. Optical Communications

Professional Elective - 6

1. Satellite Communications
2. Nano Materials and Technology
3. Television Engineering

Open Elective - 1

System Design through IoT

Open Elective - 2

Electronic Sensors

Open Elective - 3

Principles of Communications

ELECTRONIC DEVICES AND CIRCUITS

B.Tech. II Year I Semester

L	T	P	C
3	1	0	4

Pre-Requisites: Physics

Course Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To know the switching characteristics of components.
4. To give understanding of various types of amplifier circuits.

Course Outcomes

Upon completion of the Course, the students will be able to:

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Understand the biasing techniques.
4. Design and analyze small signal amplifier circuits.

UNIT I

Diode and Applications: Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times.
Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem, Comparators.

UNIT II

Bipolar Junction Transistor (BJT): Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.

UNIT III

Transistor Biasing and Stabilization : Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias Compensation using Diodes and Transistors.
Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT IV

Junction Field Effect Transistor: Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor, MOSFET Construction and its Characteristics in Enhancement and Depletion modes.

UNIT V

FET Amplifiers: Small Signal Model**,** Analysis of CS, CD, CG JFET Amplifiers. Basic Concepts of MOSFET Amplifiers.
Special Purpose Devices: Zener Diode **-** Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

TEXTBOOKS

1. Electronic Devices and Circuits - Jacob Millman, McGraw Hill Education.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, Pearson, 2009**.**

REFERENCES

1. The Art of Electrionics , Horowitz, 3rdEdition Cambridge University Press, 2018
2. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
3. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., McGraw Hill, 2008.
4. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.

NETWORK ANALYSIS AND TRANSMISSION LINES

B.Tech. II Year I Semester

L	T	P	C
3	0	0	3

Pre-Requisites: Nil

Course Objectives

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady states and transients states in RLC circuits.
3. To understand the two port network parameters.
4. To study the propagation, reflection and transmission of plane waves in bounded and unbounded media.

Course Outcomes

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

1. Gain the knowledge on basic RLC circuits behavior.
2. Analyze the Steady state and transient analysis of RLC Circuits.
3. Know the characteristics of two port network parameters.
4. Analyze the transmission line parameters and configurations.

UNIT I

Network Topology, Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT II

Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. 2^{nd} order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT III

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, π, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT IV

Transmission Lines - I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

UNIT V

Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations, Smith Chart – Configuration and Applications, Single Stub Matching.

TEXT BOOKS

1. Network Analysis – Van VelKen Burg, 3rd Ed., Pearson, 2016
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

REFERENCES

1. Electric Circuits – J. Edminister and M.Nahvi – Schaum's Outlines, MCGRAW HILL EDUCATION, 1999.
2. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 8th Edition, 1993.
3. Electromagnetics with Applications – JD. Kraus, 5th Ed., TMH
4. Transmission Lines – Richard Collier, Cambridge University Press, 2013.

SIGNALS AND SYSTEMS

B.Tech. II Year I Semester

L	T	P	C
3	1	0	4

Pre-Requisites: Mathematics

Course Objectives

This subject gives the basics of Signals and Systems required for all Electrical Engineering related courses.

The objectives of this subject are to:

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3. Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4. Identify the need for sampling of CT signals, types and merits and demerits of each type.

Course Outcomes

Upon completing this course, the student will be able to:

1. Distinguish different signals, systems and their time and frequency domain analysis.
2. Identify the conditions for transmission of signals through systems and physical realization of systems.
3. Identify the significance of LT, ZT and their relation.
4. Understand the significance of sampling types and applications of correlation functions.

UNIT I

Signal Analysis

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, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT II

Fourier series

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms

Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT III

Signal Transmission through Linear Systems

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT IV

Laplace Transforms and Z–Transforms

Laplace Transforms

Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Z–Transforms

Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

UNIT V

Sampling theorem

Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.

Correlation

Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, BSP, 2013.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed.

REFERENCES

1. Signals and Systems – Simon Haykin and Van Veen , Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH
3. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE.
5. Signals and Systems – K. Deergha Rao, Birkhauser, 2018.

SWITCHING THEORY AND LOGIC DESIGN

B.Tech. II Year I Semester

L	T	P	C
3	1	0	4

Pre-Requisites: Engineering Mathematics

Course Objectives

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand the numerical information in different forms and Boolean Algebra theorems.
2. Postulates of Boolean algebra and to minimize combinational functions.
3. Design and analyze combinational and sequential circuits.
4. Known about the logic families and realization of logic gates.

UNIT I

Number Systems

Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Boolean Algebra

Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT II

Minimization of Boolean functions

Karnaaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method,

Combinational Logic Circuits

Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

UNIT III

Sequential Circuits Fundamentals

Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters

Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

UNIT IV

Sequential Machines

Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N – Counters, Finite state machine-capabilities and limitations, Mealy and Moore models.

UNIT V

Realization of Logic Gates Using Diodes & Transistors

AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison, Classification of Integrated Circuits.

TEXT BOOKS

1. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3rdEdition, Cambridge, 2010.
2. Modern Digital Electronics – R. P. Jain, 3rd edition, Tata McGraw-Hill, 2007.

REFERENCE

1. Digital Design- Morris Mano, PHI, 4th Edition,2006
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
3. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
4. Switching Theory and Logic Design – A Anand Kumar, PHI,2013

PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech. II Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives

1. This gives basic understanding of random signals and processing.
2. Utilization of Random signals and systems in Communications and Signal Processing areas.
3. To known the Spectral and temporal characteristics of Random Process.
4. To Learn the Basic concepts of Noise sources.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand the concepts of Random Process and its Characteristics.
2. Understand the response of linear time Invariant system for a Random Processes.
3. Determine the Spectral and temporal characteristics of Random Signals.
4. Understand the concepts of Noise in Communication systems.

UNIT I

Probability & Random variables: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events.

Random Variables- Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

UNIT II

Operations on single & multiple random variables – expectations : Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable - Monotonic and Non-monotonic Transformations of Continuous and Discrete Random Variable, Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two and more Random Variables, Central Limit Theorem, Equal and Unequal Distribution.

Expected Value of a Function of Random Variables- Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT III

Random processes – Temporal characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions,

concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT IV

Random processes – Spectral characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

UNIT V

Noise sources & Information theory: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

TEXT BOOKS

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Principles of Communication systems by Taub and Schilling (TMH),2008

REFERENCES

1. Random Processes for Engineers-Bruce Hajck, Cambridge unipress,2015
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.
3. Probability, Statistics & Random Processes-K .Murugesan, P. Guruswamy, Anuradha Agencies, 3rd Edition, 2003.
4. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2003.
5. Statistical Theory of Communication – S.P Eugene Xavier, New Age Publications, 2003

ELECTRONIC DEVICES AND CIRCUITS LABORATORY

B.Tech. II Year I Semester

L	T	P	C
0	0	2	1

List of Experiments (Twelve experiments to be done):
Design (any six) and Simulation (any Ten) using Multisim or Pspice or Equivalent Simulation Software:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Measurement of h-parameters of transistor in CB, CE, CC configurations
5. Input and Output characteristics of FET in CD configuration
6. SCR Characteristics.
7. Common Emitter Amplifier Characteristics
8. Common Base Amplifier Characteristics
9. Common Source Amplifier Characteristics
10. Types of Clippers and at different reference voltage
11. Types of Clampers and at different reference voltage
12. The steady state output waveform of clampers for a square wave input
13. Comparison Operation of different types of Comparators

DIGITAL LOGIC DESIGN LABORATORY

B.Tech. II Year I Semester

L	T	P	C
0	0	2	1

List of Experiments

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4 bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops.
8. Design and realization a Synchronous and Asynchronous counters using flip-flops
9. Design and realization of Asynchronous counters using flip-flops
10. Design and realization 8x1 using 2x1 mux
11. Design and realization 2 bit comparator
12. Verification of truth tables and excitation tables
13. Realization of logic gates using DTL, TTL, ECL, etc.,
14. State reduction techniques for State machines

BASIC SIMULATION LABORATORY

B.Tech. II Year I Semester **L T P C**
0 0 2 1

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 12 experiment are to be completed/Simulated.

List of Experiments:

1. Generation of Various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
2. Operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
4. Convolution of Signals and sequences.
5. Auto Correlation and Cross Correlation of Signals and Sequences.
6. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
7. Sinusoidal responses of the given LTI system and verifying its realiazability and stability properties.
8. Gibbs Phenomenon verification.
9. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
10. Waveform Synthesis using Laplace Transform.
11. To plot pole-zero diagram in S-plane / Z-plane of given signal/sequence.
12. Generation of Gaussian noise and find its mean, Skew, Kurtosis, PDF and PSD.
13. Verification of Sampling Theorem.
14. Removal of noise by Autocorrelation / Cross correlation.
15. Extraction of Periodic Signal masked by noise using Correlation.

MATHEMATICS- III
(Common for EEE & ECE Branches)

B.Tech. II Year II Semester

L	T	P	C
3	1	0	4

Pre-requisites: Mathematics courses of first year of study.
Objectives: To learn

- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- Various methods to the find roots of an equation.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

UNIT I **10 L**

Laplace Transforms

Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by 't'. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.

Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT II **10 L**

Numerical Methods-I

Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method.

Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae; Lagrange's method of interpolation

UNIT III **8 L**

Numerical Methods-II

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.

UNIT IV **10 L**

Complex Variables (Differentiation)

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and

their properties.

UNIT V **10 L**

Complex Variables (Integration)

Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof)

Course outcomes:

After learning the contents of this paper the student must be able to

- Use the Laplace transforms techniques for solving ODE's
- Find the root of a given equation.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given ODE's
- Analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
- Taylor's and Laurent's series expansions of complex function

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

REFERENCES

1. M. K. Jain, SRK Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations , New Age International publishers.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.

ELECTROMAGNETIC FIELDS AND WAVES

B.Tech. II Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To conceptually understand the waveguides and to determine the characteristics of rectangular waveguides, microstrip lines .

Course Outcomes

Upon completing this course, the student will be able to

1. Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields.
2. Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
3. Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.
4. To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.

UNIT I

Electrostatics

Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relation 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, Capacitors – Parallel Plate, Coaxial, Spherical.

UNIT II

Magnetostatics

Biot-Savart's Law, Ampere's Circuit Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

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 Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

UNIT IV

EM Wave Characteristics

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless 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 Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

UNIT V

Waveguides

Electromagnetic Spectrum and Bands. Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Microstrip Lines – Z_o Relations, Effective Dielectric Constant.

TEXT BOOKS

1. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 8th Ed., McGrawHill,2014
2. Principles of Electromagnetics – Matthew N.O. sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition, 2015.

REFERENCES

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd Ed., PHI, 2000.
2. Engineering Electromagnetics – Nathan Ida, 2nd Ed., Springer (India) Pvt. Ltd., New Delhi, 2005.
3. Electromagnetic Field Theory Fundamentals – Bhag Singh Guru and Huseyin R. Hiziroglu, Cambridge University Press, 2nd Ed., 2006.

ANALOG AND DIGITAL COMMUNICATIONS

B.Tech. II Year II Semester

L	T	P	C
3	1	0	4

Pre-requisite: Signals and Systems

Course Objectives

1. To develop ability to analyze system requirements of analog and digital communication systems.
2. To understand the generation, detection of various analog and digital modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

Course Outcomes

Upon completing this course, the student will be able to

1. Analyze and design of various continuous wave and angle modulation and demodulation techniques.
2. Understand the effect of noise present in continuous wave and angle modulation techniques.
3. Attain the knowledge about AM , FM Transmitters and Receivers.
4. Analyze and design the various Pulse, Digital Modulation Techniques and Baseband transmission.

UNIT I

Amplitude Modulation

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, Vestigial side band modulation – Time and Frequency domain description. Noise in AM, DSB and SSB Systems.

UNIT II

Angle Modulation

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves- Armstrong Method, Detection of FM Waves: Balanced slope detector, Phase locked loop, Comparison of FM and AM. , Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT III

Transmitters

Classification of Transmitters, AM Transmitters, FM Transmitters – Variable reactance, Phase Modulator and FM.

Receivers
Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison with AM Receiver.

UNIT IV
Pulse Modulation
Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.
Pulse Code Modulation
PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT V
Digital Modulation Techniques
ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.
Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams, Cross Talk.

TEXTBOOKS

1. Analog and Digital Communications – Simon Haykin, John Wiley, 2005.
2. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, PHI, 2009.

REFERENCES

1. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, Mcgraw-Hill, 2008.
2. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
3. Electronics & Communication System – George Kennedy and Bernard Davis , TMH, 2004
4. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005

LINEAR AND DIGITAL INTEGRATED CIRCUITS

B.Tech. II Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Switching Theory and Logic Design.

Course Objectives

The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To introduce the concepts of waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

Course Outcomes

Upon completing this course, the student will be able to

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Attain the knowledge of functional diagrams and applications of IC 555 and IC 565.
3. Acquire the knowledge about the Data converters.
4. Understanding of the different families of digital integrated circuits and their characteristics.

UNIT I

Operational Amplifier

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT II

Op-Amp, IC-555 & IC 565 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, principle and Applications.

UNIT III

Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT IV

Combinational Logic ICs

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT V

Sequential Logic IC's and Memories

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Ed., 2005.

REFERENCES

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Digital Design Principles and Practices – John. F. Wakerly, Pearson 3rd Ed., 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH, 2008.
4. Operational Amplifiers with Linear Integrated Circuits, 4th Ed., William D.Stanley, Pearson Education India, 2009.

ANALOG AND PULSE CIRCUITS

B.Tech. II Year II Semester

L	T	P	C
3	1	0	4

Pre-requisite: Electronic Devices and Circuits

Course Objectives

1. Learn the concepts of high frequency analysis of transistors.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
4. To construct various multivibrators using transistors and sweep circuits.

Course Outcomes

Upon completing this course, the student will be able to

1. Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
2. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.
3. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
4. Design multivibrators and sweep circuits for various applications.

UNIT I

Multistage Amplifiers

Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency

Hybrid -πmodel of Common Emitter transistor model, f_α, β and unity gain bandwidth, Gain-bandwidth product.

UNIT II

Feedback Amplifiers

Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations.

UNIT III

Oscillators

Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

UNIT IV

Large Signal Amplifiers

Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers.

Tuned Amplifiers

Single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

UNIT V

Multivibrators

Types of Triggering, Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Time Base Generators

General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

TEXT BOOKS

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd Ed., 2010
2. Electronic Devices Conventional and current version -Thomas L. Floyd, Pearson, 2015.

REFERENCES

1. Electronic Devices and Circuits, David A. Bell – 5th Ed., Oxford, 1986.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Ed., Pearson, 2009.
3. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., TMH, 2008.
4. Pulse, Switching and Digital Circuits –David A. Bell, 5th Ed, Oxford, 2015.

ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

B.Tech. II Year II Semester

L	T	P	C
0	0	2	1

Note:

- Minimum 12 experiments should be conducted.
- All these experiments are to be simulated first either using MATLAB, Comsim or any other simulation package and then to be realized in hardware

Part A:

1. (i) Amplitude modulation and demodulation (ii) spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) spectrum analysis of FM
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. Frequency Division Multiplexing & De multiplexing
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. Frequency Shift Keying: Generation and Detection
12. Binary Phase Shift Keying: Generation and Detection
13. Generation and Detection (i) DPSK (ii) QPSK

LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY

B.Tech. II Year II Semester

L	T	P	C
0	0	2	1

Note:

- Minimum 12 experiments should be conducted.
- Verify the functionality of the IC in the given application.

Design and Implementation of:

1. Inverting and Non-inverting Amplifiers using Op Amps.
2. Adder and Subtractor using Op Amp.
3. Comparators using Op Amp.
4. Integrator Circuit using IC 741.
5. Differentiator circuit using Op Amp.
6. Active Filter Applications – LPF, HPF (first order)
7. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
8. Mono-stable Multivibrator using IC 555.
9. Astable Multivibrator using IC 555.
10. Schmitt Trigger Circuits – using IC 741.
11. IC 565 – PLL Applications.
12. Voltage Regulator using IC 723.
13. Three Terminal Voltage Regulators –7805, 7809, 7912.

ANALOG AND PULSE CIRCUITS LABORATORY

B.Tech. II Year II Semester

L	T	P	C
0	0	2	1

List of Experiments:

- Minimum 12 experiments should be conducted:

1. Current Shunt Feedback amplifier
2. Voltage Series Feedback amplifier
3. Cascode amplifier
4. Darlington Pair
5. RC Phase shift Oscillator
6. Hartley and Colpitt's Oscillators
7. Class A power amplifier
8. Class B Complementary symmetry amplifier
9. Two Stage RC Coupled Amplifier
10. Wien Bridge Oscillator using Transistors
11. Design a Bistable Multivibrator and draw its waveforms
12. Design an Astable Multivibrator and draw its waveforms
13. Design a Monostable Multivibrator and draw its waveforms
14. Response of Schmitt Trigger circuit for loop gain less than and greater than one
15. The output- voltage waveform of Boot strap sweep circuit
16. The output- voltage waveform of Miller sweep circuit
17. Pulse Synchronization of An Astable circuit
18. Response of a transistor Current sweep circuit

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Course Objective

1. To prepare engineering students to analyze cost/ revenue/ financial data and to make economic and financial analysis in decision making process and to examine the performance of companies engaged in engineering.

Course Outcome

1. To perform and evaluate present and future worth of the alternate projects and to appraise projects by using traditional and DCF Methods.
2. To carry out cost benefit analysis of projects and to calculate BEP of different alternative projects.

UNIT I

Introduction to Engineering Economics- Basic Principles and Methodology of Engineering Economics– Fundamental Concepts - Demand – Demand Determinants - Law of Demand- Demand Forecasting and Methods - Elasticity of Demand - Theory of Firm – Supply- Elasticity of Supply.

UNIT II

Macro Economic Concepts: National Income Accounting - Methods of Estimation- Various Concepts of National Income - Inflation – Definition – Causes of Inflation and Measures to Control Inflation - New Economic Policy 1991 (Industrial policy, Trade policy, and Fiscal policy) Impact on Industry.

UNIT III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT IV

Capital Budgeting Techniques: Significance of Capital Budgeting - cash flows-Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate of Return – Profitability Index.

UNIT V

Introduction to Accounting: Accounting Principles (GAPP), concepts, conventions- - Double entry system of Book keeping – Accounting rules- Journal- ledger- Trial balance- Trading and Profit and Loss account- Balance Sheet. (Simple Problems).

Suggested Readings

1. Henry Malcom Steinar-Engineering Economics, Principles, McGraw Hill Pub.
2. D.D.Chaturvedi, S.L.Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
3. Jain and Narang" Accounting, Kalyani Publishers.
4. Arora, M.N." Cost Accounting, Vikas Publication.
5. S.N.Maheshwari, Financial Management, Vikas Publishing House.

MICROPROCESSORS AND CONTROLLERS

B.Tech. III Year I Semester

L	T	P	C
3	1	0	4

Pre-requisite:

Course Objectives

1. To familiarize the architecture of microprocessors and micro controllers
2. To provide the knowledge about interfacing techniques of bus & memory.
3. To understand the concepts of ARM architecture
4. To study the basic concepts of Advanced ARM processors

Course Outcomes

Upon completing this course, the student will be able to

1. Understands the internal architecture, organization and assembly language programming of 8086 processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers
3. Understands the interfacing techniques to 8086 and 8051 based systems.
4. Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.

UNIT I

8086 Architecture

8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086

Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT II

Introduction to Microcontrollers

Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT III

I/O And Memory Interface

LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface

Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT IV

ARM Architecture

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions,

load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

Unit V
ARM Processors
Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Ed., 2006.
2. ARM System Developers guide, Andrew N Sloss, Dominic Symes, Chris Wright, Elsevier, 2012

REFERENCES

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051Microcontrollers, Architecture and Programming and Applications - K.Uma Rao, Andhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP-L138 Experimenter, Donald Reay,WILEY 2012.

COMPUTER NETWORKS

B.Tech. III Year I Semester **L T P C**
3 1 0 4

Pre-requisite: Digital Communications

Course Objectives

1. To understand the source and channel coding schemes.
2. To introduce the fundamental various types of computer networks.
3. To demonstrate the TCP/IP and OSI models with merits and demerits.
4. To introduce the concepts of various layers.

Course Outcomes

Upon completing this course, the student will be able to

1. Design the source and channel codes.
2. Explore the basics of Computer Networks and Various Protocols.
3. Understand the mechanism of routing the data in various layers.
4. Administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.

UNIT I

Computer Networks and the Internet

Internet, Network Edge, the Network Core, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models.

Network Models

Layered Tasks, OSI Model, Layers in OSI Model, TCP/IP Protocol Suite, Addressing.

Transmission Media

Guided Media, Unguided Media- Wireless.

UNIT II

Data Link Layer

Channel coding- Hamming coding, Block Coding, Cyclic Codes, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point-to-Point Protocol (PPP), Random Access, Controlled Access, Channelization.

UNIT III

Network Layer

Introduction Virtual Circuit and Datagram Networks, Internet Protocols-IPv4 and IPv6, Router, Routing Algorithms, Broadcast and Multicasting Routing.

UNIT IV

Transport Layer

Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport - UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport-TCP, Principles of Congestion Control.

Application Layer

Principles of Network Applications, WWW and HTTP, FTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications, Socket Programming, Creating Network Applications.

UNIT V

Wireless and Mobile Networks

Introduction, Wireless Links and Network Characteristics, WiFi, IEEE 802.11 Wireless LANs, Cellular Internet Access, Mobility Management- Principles, Mobile IP, Managing Mobility in Cellular Networks, Wireless and Mobility, Impact on Higher-Layer Protocols.

TEXT BOOKS

1. Data Communications and Networking – Behrouz A. Forouzan, 4th Ed., TMH, 2006.
2. Computer Networks -- Andrew S Tanenbaum, 3th Ed., Pearson Education, 1999.

REFERENCES

1. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2010.
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K.W.Ross, 3rd Ed., Pearson Education, 2010.
3. Data and Computer Communications, G.S.Hura and M.Singhal, CRC Press, Taylor and Francis Group, 2010.
4. Data Communications and Computer Networks, P.C.Gupta, PHI, 2nd Ed., 2010.

CONTROL SYSTEMS

B.Tech. III Year I Semester

L	T	P	C
3	1	0	4

Pre-requisite: Network Analysis & Transmission lines

Course Objectives: Objectives of course are

1. To introduce the principles and applications of control systems in everyday life
2. To introduce the basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems
3. To understand different aspects of stability analysis of systems in frequency domain and time domain.

Course Outcomes:

After completing this course, the student will be able to

1. Knowledge on Open and closed loop and also modeling and transfer function derivations of translational and rotational systems.
2. Represent transfer functions through block diagrams and signal flow graphs.
3. Designing control systems using time domain and frequency domain techniques.
4. Time response analysis, stability analysis, frequency response analysis of different ordered systems through their characteristic equation and time-domain specifications.

UNIT I

Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.

Transfer Function Representation

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT II

Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT III

Stability Analysis

The concept of stability - Routh stability criterion – qualitative stability and conditional stability.

Root Locus Technique

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

Frequency Response Analysis
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT IV
Stability Analysis In Frequency Domain
Polar Plots, Nyquist Plots and applications of Nyquist criterion for stability –Effects of adding poles and zeros.
Classical Control Design Techniques
Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT V
State Space Analysis Of Continuous Systems
Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization, Solving the Time invariant state Equations, State Transition Matrix and its Properties.

TEXT BOOKS

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.
2. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.

REFERENCES

1. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
2. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
3. Control Systems Engg. by NISE 3rd Edition – John wiley
4. Control Systems by S.Kesavan , Hitech Publications.
5. "Modeling & Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers.

OPERATING SYSTEMS
(PE 1)

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Prerequisites: Computer Programming and Data Structures

Course Objectives

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
2. Introduce the issues to be considered in the design and development of operating system.
3. To know the basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

Course Outcomes

After completing this course, the student will be able to

1. Gain practical knowledge of operating systems and architectures interact.
2. Knowledge on Scheduling, deadlocks, process management and synchronization.
3. Acquaintance to Memory Management and Virtual Memory.
4. Ability to recognize and resolve user problems with standard operating environments.

UNIT I

Operating System Introduction, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls.

UNIT II

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

System call interface for process management-fork, exit, wait, waitpid, exec

UNIT – III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl, system calls.

TEXT BOOKS

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE

1. Operating Systems – Internals and Design Principles Stallings, 5th Ed., Pearson Education/PHI, 2005.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd Ed., Pearson/PHI.
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education.
5. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(PE 1)

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Prerequisites: Computer Programming & Data Structures

Course Objectives

1. Introduces object oriented programming concepts using the Java language.
2. To know the principle of inheritance and polymorphism and demonstrates how they relate to the design of abstract classes
3. Able to implement packages, interfaces, exception handling, event handling and multithreading
4. To design of Graphical User Interface using applets and swings

Course Outcomes

After completing this course, the student will be able to

1. Learn the object oriented concepts using the JAVA programming
2. Understand benefits of inheritance, creating packages and implement of interfaces
3. Differentiate between multi threading and multitasking.
4. Understand the concepts of Exception, Event handling, Applets and Swing.

UNIT I

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class.

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

Exploring java.io.

UNIT III

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

String handling,Exploring java.util.Differences between multi threading and multitasking, thread life cycle,creating threads, thread priorities, synchronizing threads, interthread communication, thread groups,daemon threads.
Enumerations, autoboxing, annotations, generics.

UNIT IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.
The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.
Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS

1. Java the complete reference, 7th editon, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Eduction.

REFERENCES

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. An introduction to Java programming and object oriented application development, R.A. Johnson- Thomson.

DATA ANALYTICS
(PE 1)

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Course Objectives

1. To gain the knowledge in data management, Processing and Analytics.
2. To know the concepts of Regression and its models.
3. To know the concepts of Segmentation and its models.
4. To gain the knowledge on Data Visualization and its techniques.

Course Outcomes

After completing this course, the student will be able to

1. Know the data management and its processing.
2. Capable to model the data using tools.
3. Differentiate between regression and Segmentation of data.
4. Learn various Visualization techniques.

UNIT – I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing.

UNIT – II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT – III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT – IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT – V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCES

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand RajaramanMilliway

MICROPROCESSORS AND CONTROLLERS LABORATORY

B.Tech. III Year I Semester

L	T	P	C
0	0	3	1.5

Cycle 1: Using 8086 Processor Kits and/or Assembler (5 Weeks)

- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32 Bit Data.
  2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using 8051 Microcontroller Kit (6 weeks)

- Introduction to IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
  2. Time delay Generation Using Timers of 8051.
  3. Serial Communication from / to 8051 to / from I/O devices.
  4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer0 8051 in 8bit Auto reload Mode and Connect a 1HZ Pulse to INT1 pin and Display on Port0.Assume Crystal Frequency as 11.0592MHZ

Cycle 3: Interfacing I/O Devices to 8051(5 Weeks)

1. 7 Segment Display to 8051.
2. Matrix Keypad to 8051.
3. Sequence Generator Using Serial Interface in 8051.
4. 8bit ADC Interface to 8051.
5. Triangular Wave Generator through DAC interfaces to 8051.

BOOKS

1. Advanced Microprocessors And Peripherals by A K Ray, Tata McGraw-Hill Education, 2006
2. The 8051 *Microcontrollers*: Architecture, Programming & Applications by Dr. K. Uma Rao, Andhe Pallavi, Pearson, 2009.

COMPUTER NETWORKS LABORATORY

B.Tech. III Year I Semester

L	T	P	C
0	0	3	1.5

Note:

A. Minimum of 12 Experiments have to be conducted
B. All the Experiments may be Conducted using Network Simulation software likeNS-2/NS 3/ NSG-2.1/Wire SHARK/ etc..

Note: For Experiments 2 to 10 Performance may be evaluated through simulation by using the parameters Throughput, Packet Delivery Ratio, Delay etc.

1. Writing a TCL Script to create two nodes and links between nodes
2. Writing a TCL Script to transmit data between nodes
3. Evaluate the performance of various LAN Topologies
4. Evaluate the performance of Drop Tail and RED queue management schemes
5. Evaluate the performance of CBQ and FQ Scheduling Mechanisms
6. Evaluate the performance of TCP and UDP Protocols
7. Evaluate the performance of TCP, New Reno and Vegas
8. Evaluate the performance of AODV and DSR routing protocols
9. Evaluate the performance of AODV and DSDV routing protocols
10. Evaluate the performance of IEEE 802.11 and IEEE 802.15.4
11. Evaluate the performance of IEEE 802.11 and SMAC
12. Capturing and Analysis of TCP and IP Packets
13. Simulation and Analysis of ICMP and IGMP Packets
14. Analyze the Protocols SCTP , ARP, NetBIOS, IPX VINES
15. Analysis of HTTP ,DNS and DHCP Protocols

* Simulation of the above experiments to be conducted using NS-2, NSG 2.1, Wire Shark.

ADVANCED ENGLISH LANGUAGE AND COMMUNICATION SKILLS (AECS) LABORATORY

B.Tech. III Year I Semester

L	T	P	C
0	0	2	1

Introduction

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

1. Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. Syllabus:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.

4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. Minimum Requirement:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- **Spacious room with appropriate acoustics.**
- **Round Tables with movable chairs**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ**
- **T. V, a digital stereo & Camcorder**
- **Headphones of High quality**

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE**(KAPLAN, AARCO&BARRONS, USA, Cracking GRE by CLIFFS)

6. Books Recommended:

1. **Effective Technical Communication** by M Asharaf Rizvi**.** McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. **Academic Writing: A Handbook for International Students b**y Stephen Bailey, Routledge, 5th Edition
3. **Learn Correct English – A Book of Grammar, Usage and Composition** by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
4. **Professional Communication** by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
5. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
6. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
7. **English Vocabulary in Use** series, Cambridge University Press 2008.
8. **Handbook for Technical Communication** by David A. McMurrey& Joanne Buckley. 2012. Cengage Learning.
9. **Communication Skills** by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
10. **Job Hunting by** Colm Downes, Cambridge University Press 2008.
11. **English for Technical Communication for Engineering Students,** Aysha Vishwamohan**, Tata Mc Graw-Hil 2009.**

ANTENNAS AND PROPAGATION

B.Tech. III Year II Semester

L	T	P	C
3	1	0	4

Pre-requisite: Electromagnetic Theory and Transmission Lines

Course Objectives

The course objectives are:

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To analyze the characteristics and design relations of UHF, VHF and Microwave Antennas.
3. To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
4. To understand the concepts and set-up requirements for microwave measurements, and familiarize with the procedure to enable antenna measurements.
5. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

Course Outcomes

Upon completing this course, the student will be able to

Explain the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations.

1. Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays.
2. Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory.
3. Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.

UNIT I

Antenna Basics

Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height.

Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem.

Thin Linear Wire Antennas

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 and Patterns of Thin Linear Centre-fed Antennas of Different Lengths. Loop Antennas - Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT II

Antenna Arrays

Point Sources – Definition, Patterns**,** arrays of 2 Isotropic Sources **-** Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

Antenna Measurements

Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

UNIT III

VHF, UHF and Microwave Antennas - I

Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns.

UNIT IV

VHF, UHF and Microwave Antennas – II

Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

UNIT V

Wave Propagation

Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts,

Ground Wave Propagation

Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections.

Space Wave Propagation

Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Sky Wave Propagation

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.

TEXT BOOKS

1. Antennas and Wave Propagation – J.D. Kraus, R.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 K.G. Balmain, PHI, 2nd ed., 2000.

REFERENCES

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Radio Engineering Handbook- Keith henney, 3rd edition TMH.
4. Antenna Engineering Handbook –John Leonidas Volakis, 3rd edition,2007

DIGITAL SIGNAL PROCESSING

B.Tech. III Year II Semester

L	T	P	C
3	1	0	4

Prerequisite: Signals and Systems

Course Objectives

The course objectives are:

1. To provide background and fundamental concepts for the analysis and processing of digital signals.
2. To understand the fast computation of DFS and DFT.
3. To design digital filters and their realization structures.
4. To acquaint in Multi-rate signal processing techniques and finite word length effects.

Course Outcomes

Upon completing this course, the student will be able to:

1. Understand the LTI-DT systems, their frequency domain representation and realization.
2. Distinguish DFTS, DFS, DFT and FFT.
3. Design IIR and FIR digital filters from prototype approximations.
4. The importance of Multirate signal processing and finite word length effects in DSP applications.

UNIT I

Introduction

Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems.

Realization of Digital Filters

Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT II

Discrete Fourier series

Fourier Series, Fourier Transform, Laplace Transform and Z-Transform relation, DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform.

Fast Fourier Transforms

Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT III

IIR Digital Filters

Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT IV

FIR Digital Filters

Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT V

Multirate Digital Signal Processing

Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion.

Finite Word Length Effects

Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

TEXT BOOKS

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.

REFERENCES

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – K. Deergha Rao and M. N. S. Swamy, Springer, 2018.
4. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

VLSI DESIGN

B.Tech. III Year II Semester

L	T	P	C
3	1	0	4

Prerequisite: Analog and Pulse circuits; Switching Theory and Logic Design

Course Objectives

The objectives of the course are to:

1. Give exposure to different steps involved in the fabrication of ICs.
2. Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters with various loads.
3. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
4. Provide design concepts to design building blocks of data path of any system using gates.
5. Understand basic programmable logic devices and testing of CMOS circuits.

Course Outcomes

Upon completing this course, the student will be able to

1. Acquire qualitative knowledge about the fabrication process MOS ICs.
2. Draw the layout of any logic circuit to understand and estimate parasitic effect of any logic circuit.
3. Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD.
4. Understand different types of faults that can occur in a system and learn the concept of testing.

UNIT I

Introduction

Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

Basic Electrical Properties

Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT II

VLSI Circuit Design Processes

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT III

Gate Level Design

Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out.

UNIT IV

Data Path Subsystems

Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems

SRAM, DRAM, ROM, Serial Access Memories.

UNIT V

Programmable Logic Devices

Design Approach – PLA, PAL, Standard Cells FPGAs, CPLDs.

CMOS Testing

CMOS Testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXT BOOKS

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005.
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed., Pearson, 2009.

REFERENCES

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Ed., 1997.

CELLULAR AND MOBILE COMMUNICATIONS
(PE - 2)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Digital Communications

Course Objectives

The course objectives are:

1. To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
2. To provide the student with an understanding of Co-channel and Non-Co-channel interferences.
3. To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
4. To give the student an understanding of frequency management, Channel assignment and types of handoff.

Course Outcomes

Upon completing this course, the student will be able to

1. Known the evolution of cellular and mobile communication systems.
2. The student will be able to understand Co-channel and Non Co-channel interferences.
3. Understand impairments due to multipath fading channel and how to overcome the different fading effects.
4. Familiar with cell coverage for signal and traffic, diversity techniques, frequency management, Channel assignment and types of handoff.

UNIT I

Introduction to Cellular Mobile Radio Systems

Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

Fundamentals of Cellular Radio System Design

Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT II

Co-Channel Interference

Measurement Of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity.

Non-Co-Channel Interference

Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

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, Path Loss From a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

Cell Site and Mobile Antennas

Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

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.

UNIT V

Handoffs and Dropped Calls

Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.

TEXT BOOKS

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Ed., 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson Education, 2nd Ed., 2002.

REFERENCES

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Ed., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Eduction, 2005.
3. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
4. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

BIO-MEDICAL ELECTRONICS
(PE-2)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: NIL

Course Objectives

1. To Understand the application of the electronic systems in biological and medical applications.
2. To explore the process of acquiring bio data from sensors and transducers.
3. To understand the recording, process and analysis of bio signals.
4. To expertise with measuring techniques of bio parameters.

Course Outcomes

Upon completing this course, the student will be able to

1. Know the functionality of human anatomy and physiology.
2. Understand the practical limitations on the electronic components while handling bio substances.
3. Understand the functionality of biomedical recorders.
4. Measure and analyse the biomedical parameters.

UNIT I

Anatomy and Physiology

Brief introduction to human physiology, Heart and Circulatory system, Central Nervous System, Respiratory system, body temperature and reproduction system.

UNIT II

Bio-electrodes

Bio electric signal, Bio potential electrodes –External electrodes, internal electrodes, Bio chemical electrodes, Electrode tissue interface, contact impedance.

UNIT III

Biomedical transducers

Typical signals from physiological parameters, Classification of Transducers-Pressure, force, acceleration, flow, respiration sensor, Smart sensors, pulse sensor, temperature, potential, dissolved ions and gases.

UNIT IV

Bio medical Recorders

Block diagram, working principle of VCG, PCG, ECG, EMG and EEG.

UNIT V

Measurements

Blood temperature, Pressure and flow Impedance plethysmography. Ultrasonic, X-ray, CT-Scan, MRI, and nuclear imaging. Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped. Safety aspects.

TEXT BOOKS

1. Introduction to Bio Medical Electronics-Edward J. Perkistein, Howard Bj, USA
2. Handbook of Bio Medical Instrumentation, R S Khandpur, TMH, 2003.

REFERENCES

1. Review of Medical Physiology- W.F. Ganong,, 8th Asian Ed., Medical Publishers, 1977.
2. Medical Instrumentation- J.G. Websster, Ed., Houghton Mifflin, 1978.
3. Therapeutic Medical Devices - A.M. Cook and J.G. Webster, ed., Prentice-Hall, 1982.
4. Modern electronic Equipment by R S Khandpur, TMH

INFORMATION THEORY AND CODING
(PE-2)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Digital Communications

Course Objectives
1. To acquire the knowledge in measurement of information and errors.
2. Understand the importance of various codes for communication systems.
3. To design encoder and decoder of various codes.
4. To known the applicability of source and channel codes.

Course Outcomes
Upon completing this course, the student will be able to
1. Learn measurement of information and errors.
2. Obtain knowledge in designing various source codes and channel codes.
3. Design encoders and decoders for block and cyclic codes.
4. Understand the significance of codes in various applications.

UNIT I
Coding for Reliable Digital Transmission and storage
Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.
Source Codes: Shannon-fano coding, Huffman coding

UNIT II
Linear Block Codes
Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT III
Cyclic Codes
Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT IV
Convolutional Codes
Encoding of Convolutional Codes- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT V

BCH Codes

Minimum distance and BCH bounds, Decoding procedure for BCH codes, Syndrome computation and iterative algorithms, Error locations polynomials for single and double error correction.

TEXT BOOKS

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice Hall, Inc 2014.
2. Error Correcting Coding Theory-Man Young Rhee, McGraw – Hill Publishing, 1989.

REFERENCES

1. Digital Communications- John G. Proakis, 5th Ed., TMH, 2008.
2. Introduction to Error Control Codes-Salvatore Gravano, oxford
3. Error Correction Coding – Mathematical Methods and Algorithms - Todd K.Moon, Wiley India, 2006.
4. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Ed., TMH, 2009.

System Design through IoT
(OE 1)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite:

Course Objectives

The objectives of the course are to

1. understand the concepts of Internet of Things and able to build IoT applications.
2. Learn the programming and use of Arduino and Raspberry Pi boards.
3. Known about data handling and analytics in SDN.

Course Outcomes

Upon completing this course, the student will be able to

1. Known basic protocols in sensor networks.
2. Program and configure Arduino boards for various designs.
3. Python programming and interfacing for Raspberry Pi.
4. Design IoT applications in different domains.

UNIT I

Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

UNIT II

Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino,

UNIT III

Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi

UNIT IV

Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics,

UNIT V

Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study- Agriculture, Healthcare, Activity Monitoring.

TEXT BOOKS

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases, by Pethuru Raj and Anupama C. Raman (CRC Press)
2. Make sensors: Terokarvinen, kemo, karvinen and villey valtokari, 1st Ed., Maker Media, 2014.

REFERENCES

1. Internet of Things: A Hands-on Approach, by Arshdeep Bahga and Vijay Madisetti.
2. Fundamentals of Wireless Sensor Networks: Theory and Practice - Waltenegus Dargie, Christian Poellabauer.
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013.

DIGITAL SIGNAL PROCESSING LABORATORY

B.Tech. III Year II Semester

L	T	P	C
0	0	3	1.5

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations.
2. To find DFT / IDFT of given DT Signal.
3. To find Frequency Response of a System given in Transfer Function/ Differential equation form.
4. Implementation of FFT of given Sequence.
5. Determination of Power Spectrum of a given Signal(s).
6. Implementation of LP FIR Filter for a given Sequence/Signal.
7. Implementation of HP IIR Filter for a given Sequence/Signal.
8. Generation of Narrow Band Signal through Filtering.
9. Generation of DTMF Signals.
10. Implementation of Decimation Process.
11. Implementation of Interpolation Process.
12. Implementation of I/D Sampling Rate Converters.
13. Impulse Response of First order and Second Order Systems.

VLSI DESIGN LABORATORY

B.Tech. III Year II Semester

L	T	P	C
0	0	3	1.5

Note: Any **SIX of** the following experiments from each part are to be conducted (**Total 12**)

Part-I

The following experiments have to be implemented in HDL.

1. Realization of all the logic gates.
2. Design of 8-to-3 encoder (without and with priority) and 2-to-4 decoder.
3. Design of 8-to-1 multiplexer and 1-to-8 demultiplexer.
4. Design of 4 bit binary to gray code converter.
5. Design of 4 bit comparator.
6. Design of Full adder using 3 modeling styles.
7. Design of flip flops: SR, D, JK, T.
8. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter.
9. Design of Finite State Machines.

Part-II

1. Basic logic gates.
2. CMOS inverter.
3. CMOS NOR/ NAND gates.
4. CMOS XOR and MUX gates.
5. Static / Dynamic logic circuit (register cell).
6. Latch.
7. Pass transistor.
8. Layout of any combinational circuit (complex CMOS logic gate).

ADVANCED COMMUNICATIONS LABORATORY

B.Tech. III Year II Semester

L	T	P	C
0	0	2	1

Note: Minimum **Eight** experiments should be conducted:

1. Study the features of Network and spectrum analyzer
2. Measurement of Radiation pattern for different antennas.
   i. Dipole Antenna
   ii. Horn antenna
   iii. Microstrip Antenna etc.
3. Measurement of Radiation resistance for different antennas.
   i. Dipole Antenna
   ii. Horn antenna
   iii. Microstrip Antenna etc.
4. Measurement of eye diagram for baseband signal
5. Constellation Diagram of QAM
6. OFDM generation and detection
7. Generation of different types of signals using Vector Signal Generator
8. Vector signal analysis for modulation analysis on digital modulated single carrier signals
9. Reading analog and digital sensors data using UART
10. Collecting sensor values of remote nodes using RIME broadcasting

MICROWAVE ENGINEERING

B.Tech. IV Year I Semester

L	T	P	C
2	0	0	2

Pre-requisite: Antennas and Propagation

Course Objectives

1. To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
2. To distinguish between different types of microwave tubes, their structures and principles of microwave power generation.
3. To impart the knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave junctions.
4. Understand the measurement concepts at microwave frequencies.

Course Outcomes

Upon completing this course, the student will be able to

1. Known power generation at microwave frequencies and derive the performance characteristics.
2. Realize the need for solid state microwave sources and understand the principles of solid state devices.
3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications.
4. Understand the utility of S-parameters in microwave component design learn the measurement procedure of various microwave parameters.

UNIT I

Microwave Tubes

Limitations and Losses of conventional Tubes at Microwave Frequencies, Microwave Tubes – O Type and M Type Classifications, O-type Tubes : 2 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 and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and O/P Characteristics.

UNIT II

Helix TWTs

Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

M-Type Tubes

Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics,

UNIT III

Microwave Solid State Devices

Introduction, Classification, Applications. TEDs – Introduction, Gunn Diodes – Principle, RWH Theory, Characteristics, Modes of Operation - Gunn Oscillation Modes, Principle of operation of IMPATT and TRAPATT Devices.

UNIT IV

Waveguide Components

Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters – Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions - E plane and H plane Tees. Ferrites– Composition and Characteristics, Faraday Rotation, Ferrite Components – Gyrator, Isolator

UNIT V

Scattering matrix

Scattering Matrix Properties, Directional Couplers – 2 Hole, Bethe Hole, [s] matrix of Magic Tee and Circulator.

Microwave Measurements

Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Measurement of Attenuation, Frequency. Standing Wave Measurements, measurement of Low and High VSWR, Cavity Q, Impedance Measurements.

TEXT BOOKS

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson, 3rd Ed., 2003.
2. Microwave Principles- Herbert J. Reich, J. G. Skalnik, P. F. Ordung and H. L. Krauss, CBS Publishers and distributers, 2004.

REFERENCES

1. Microwave Engineering - David M. Pozar, John Wiley & Sons (Asia) Pvt Ltd., 1989, 3rd Ed., 2011 Reprint.
2. Microwave Engineering - G.S. Raghuvanshi, Cengage Learning India Pvt. Ltd., 2012.
3. Microwave Engineering Passive Circuits- Peter A. Rizzi, PHI, 1999.

DIGITAL IMAGE PROCESSING
(PE - 3)

B. Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Digital Signal Processing

Course Objectives

The objectives of this course are:

1. To provide an approach towards image processing and introduction about 2D transforms.
2. To understand various enhancement methods in time, frequency domains and restoration techniques.
3. To understand the concepts of segmentation and Morphological operations on an image.
4. To explore the concepts of various compression techniques.

Course Outcomes

Upon completion of this course, the student will be able to:

1. Understand the fundamentals of image processing and important transformations used.
2. Perform spatial and frequency domain enhancement techniques.
3. Apply techniques for segmenting image and perform morphological operations.
4. Understand the need for compression and various compression techniques.

UNIT I

Digital Image Fundamentals & Image Transforms

Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels.

Image Transforms

2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT II

Image Enhancement (Spatial Domain)

Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram equalization, Gray Level Transformations, Median Filter, Spatial Domain Low-pass and High-Pass Filtering.

Image Enhancement (Frequency Domain)

Filtering in Frequency Domain: Low Pass (Smoothing) and High Pass (Sharpening) Filters.

UNIT III

Image Restoration

Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT IV

Image Segmentation

Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing

Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT V

Image Compression

Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression.

TEXT BOOKS

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 4th Ed., Pearson, 2018.
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

REFERENCES

1. Digital Image Processing and Analysis - Human and Computer Vision Application with using CVIP Tools - Scotte Umbaugh, 2nd Ed., CRC Press, 2011.
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Ed., TMH, 2010.
3. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
4. Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2nd Ed., BS Publication, 2008.

SPEECH PROCESSING
(PE - 3)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Signals and Systems and Probability Theory and Stochastic Processes

Course Objectives

The objectives of this course are to make the student

1. Understand the anatomy and Physiology of Speech Production system and perception model and to design an electrical equivalent of Acoustic model for Speech Production.
2. To analyze the speech in time domain and extract various time domain parameters which can be used for various applications like pitch extraction, end point detection, Speech Compression, Speech Synthesis etc.,
3. To study the concept of Homomorphic system and its use in extracting the vocal tract information from speech using Cepstrum which is a bye product of Homomorphic processing of Speech.
4. To study various Speech Signal Processing applications viz: Speech Enhancement, Speech Recognition, Speaker Recognition.

Course Outcomes

On completion of this course student will be able to

1. Model an electrical equivalent of Speech Production system.
2. Extract the LPC coefficients that can be used to Synthesize or compress the speech.
3. Design a Homomorphic Vocoder for coding and decoding of speech.
4. Enhance the speech and can design an Isolated word recognition system using HMM.
5. Can extract the features for Automatic speaker recognition system which can used for classification.

UNIT I
Fundamentals of Digital Speech Processing
Anatomy & Physiology of Speech Organs, The process of Speech Production, The Acoustic Theory of Speech Production – Uniform lossless tube model, effect of losses in vocal tract, effect if radiation at lips, Digital models for speech signals.

UNIT II
Time Domain Models for Speech Processing
Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach. The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT III
Linear predictive Coding (LPC) Analysis
Basic principles of Linear Predictive Analysis : The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equation, comparison between the Method

of Solution of the LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT IV

Homomorphic Speech Processing

Introduction Homomrphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, pitch Detection, Formant Estimation, and The Homomorphic Vocoder.

Speech Enhancement-Nature of interfering sounds, Speech enhancement techniques: Single microphone Approach: spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

UNIT V

Automatic Speech & Speaker Recognition

Basic pattern recognition approaches, parametric representation of speech, evaluating the similarity of speech patterns, isolated digit Recognition System, Continuous digit Recognition System

Hidden Markov Model (HMM) for Speech

Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS.

Speaker Recognition

Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification Systems, Speaker identification Systems.

TEXT BOOKS

1. Digital Processing of Speech Signals – L.R. Rabiner S. W. Schafer. Pearson Education.
2. Speech Communication : Human & Machine – Douglas O' Shaughnessy, 2nd Ed., EEE Press.
3. Digital Processing of Speech Signals L.R Rabinar and RW Schafer, 1978, PHI.

REFERENCES

1. Discrete Time Speech Signal Processing: Principles and Practice – Thomas F. Quateri, 1st Ed., PE.
2. Speech & Audio Signal Processing – Ben Gold & Nelson Morgan, 1st Ed., Wiley.

SCRIPTING LANGUAGES
(PE - 3)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Objectives

The objectives of this course are:

1. Able to differentiate scripting and non- scripting languages.
2. To learn Scripting languages such as PERL, TCL/TK and python, their strengths and weaknesses.
3. Expertise to program in the Linux environment.
4. Usage of regular expressions, text processing, client and server level scripting.

Course Outcomes

Upon completing this course, the student will be able to

1. Known about basics of Linux and Linux Networking.
2. To write simple scripts to automate system administration tasks and applications.
3. Understand the concepts of Scripting, the role of scripting languages and their syntax and schematics.
4. Create and run scripts using PERL/TCL/Python.

UNIT I

Linux Basics

Introduction to Linux , File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

UNIT II

Linux Networking

Introduction to Networking in Linux, Network basics & Tools, File Transfer Protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

UNIT III

PERL Scripting.

Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running and Debugging Perl, Modules, Object – Oriented Perl.

UNIT IV

Tcl / Tk Scripting

Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple Tk Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

UNIT V

Python Scripting

Introduction to Python, using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

TEXT BOOKS

1. Practical Programming in Tcl and Tk by Brent Welch, Updated for Tcl 7.4 and Tk 4.0.
2. Red Hat Enterprise Linux 4 : System Administration Guide Copyright, Red Hat Inc, 2005.
3. Python for scientist – John M. Stewart, 2nd Ed., Cambridge University Press, 2017.

REFERENCES

1. Learning Python – Mark Lutz and David Ascher, 2nd Ed., O'Reilly, 2003.
2. Learning Perl – Randal Schwartz, Tom Phoenix and Brain d foy, 4th Ed., 2005.
3. Python Essentials – Samuele Pedroni and Noel Pappin. O'Reilly, 2002.
4. Programming Perl – Larry Wall, Tom Christiansen and John Orwant, 3rd Ed., O'Reilly, 2000.

NETWORK SECURITY AND CRYPTOGRAPHY
(PE - 4)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Objectives

1. Understand the basic concept of Cryptography and Network Security, their mathematical models.
2. To understand the necessity of network security, threats/vulnerabilities to networks and countermeasures.
3. To understand Authentication functions with Message Authentication Codes and Hash Functions.
4. To provide familiarity in Intrusion detection and Firewall Design Principles.

Course Outcomes

Upon completing this course, the student will be able to

1. Describe network security fundamental concepts and principles.
2. Encrypt and decrypt messages using block ciphers and network security technology and protocols.
3. Analyze key agreement algorithms to identify their weaknesses.
4. Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities.

UNIT I

Security Services, Mechanisms and Attacks, A Model for Internetwork security, Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques

Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Block Cipher Design Principles.

UNIT II

Encryption

Triple DES, International Data Encryption algorithm, Blowfish, RC5, Characteristics of Advanced Symmetric block Ciphers. Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT III

Public Key Cryptography

Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy.

Number Theory

Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT IV

Message Authentication and Hash Functions

Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms

MD-5, Message digest Algorithm, Secure Hash Algorithm.

Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications

Kerberos, Electronic Mail Security: Pretty Good Privacy, SIME/MIME.

UNIT V

IP Security

Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms

Intruders, Viruses and Related threats.

Fire Walls

Fire wall Design Principles, Trusted systems.

TEXT BOOKS

1. Cryptography and Network Security - Principles and Practice - William Stallings, Pearson Education.
2. Network Security - The complete reference, Robert Bragg, Mark Rhodes, TMH,2004.

REFERENCES

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Fundamentals of Network Security by Eric Maiwald (Dreamtech press).
3. Principles of Information Security, Whitman, Thomson.
4. Introduction to Cryptography, Buchmann, Springer.

ARTIFICIAL NEURAL NETWORKS
(PE - 4)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Objectives

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithms.
3. To known the issues of various feed forward and feedback neural networks.
4. To explore the Neuro dynamic models for various problems.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand the similarity of Biological networks and Neural networks.
2. Perform the training of neural networks using various learning rules.
3. Understanding the concepts of forward and backward propagations.
4. Understand and Construct the Hopfield models.

UNIT I

Introduction

A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process

Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process.

UNIT II

Single Layer Perceptrons

Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment.

Multilayer Perceptron

Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection.

UNIT III

Back Propagation

Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning.

UNIT IV

Self-Organization Maps (SOM)

Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification.

UNIT V

Neuro Dynamics

Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm.

Hopfield Models

Hopfield Models, restricted boltzmen machine.

TEXT BOOKS

1. Neural Networks a Comprehensive Foundations, Simon S Haykin, PHI Ed.,.
2. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed., 2006.

REFERENCES

1. Neural Networks in Computer Inteligance - Li Min Fu ,TMH, 2003.
2. Neural Networks -James A Freeman David M S Kapura,Pearson Ed., 2004.
3. Artificial Neural Networks - B. Vegnanarayana, Prentice Hall of India Pvt Ltd, 2005.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(PE - 4)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Basic Electrical and Electronics Engineering

Course Objectives

It provides an understanding of various measuring system functioning and metrics for performance analysis.

1. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
2. Understanding the concepts of various measuring bridges and their balancing conditions.
3. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes

Upon completing this course, the student will be able to

1. Measure electrical parameters with different meters and understand the basic definition of measuring parameters.
2. Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
3. Operate an Oscilloscope to measure various signals.
4. Measure various physical parameters by appropriately selecting the transducers.

UNIT I
Block Schematics of Measuring Systems
Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag ;Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT II
Signal Analyzers
AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

UNIT III

Oscilloscopes

CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes

Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT IV

Transducers

Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers, gyroscopes, accelerometers.

UNIT V

Bridges

Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters

Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

TEXT BOOKS

1. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI 5th Ed., 2003.
2. Electronic Instrumentation: H.S.Kalsi – TMH, 2nd Ed., 2004.

REFERENCES

1. Electrical And Electronic Measurement And Measuring Instruments – A K Sawhney, Dhanpat Rai & Sons, 2013.
2. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
3. Industrial Instrumentation: T.R. Padmanabham Springer 2009.
4. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.

ELECTRONIC SENSORS
(OE 2)

B. Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Course Objectives

1. Learn the characterization of sensors.
2. Known the working of Electromechanical, Thermal, Magnetic and radiation sensors.
3. Understand the concepts of Electro analytic and smart sensors.
4. Able to use sensors in different applications.

Course Outcomes

Upon completing this course, the student will be able to

1. Learn about sensor Principle, Classification and Characterization.
2. Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analytic sensors.
3. Understand the basic concepts of Smart Sensors.
4. Design a system with sensors.

UNIT I

Sensors / Transducers

Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization

Electromechanical Sensors

Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor –Types-Capacitive Sensors: ,Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators ,Ultrasonic Sensors.

UNIT II

Thermal Sensors

Introduction ,Gas thermometric Sensors ,Thermal Expansion Type Thermometric Sensors ,Acoustic Temperature Sensor ,Dielectric Constant and Refractive Index thermo sensors ,Helium Low Temperature Thermometer ,Nuclear Thermometer ,Magnetic Thermometer ,Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors.

UNIT III

Magnetic sensors

Introduction ,Sensors and the Principles Behind ,Magneto-resistive Sensors ,Anisotropic Magneto resistive Sensing ,Semiconductor Magneto resistors, Hall Effect and Sensors ,Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers , Synchros.

UNIT IV

Radiation Sensors

Introduction ,Basic Characteristics ,Types of Photo resistors/ Photo detectors, X-ray and Nuclear Radiation Sensors, Fibre Optic Sensors.

Electro analytical Sensors

The Electrochemical Cell ,The Cell Potential - Standard Hydrogen Electrode (SHE),Liquid Junction and Other Potentials, Polarization , Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.

UNIT V

Smart Sensors

Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing - Data Communication, Standards for Smart Sensor Interface, the Automation

Sensors Applications

Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing –Sensors for environmental Monitoring

TEXT BOOKS

1. "Sensors and Transducers - D. Patranabis" –PHI Learning Private Limited., 2003.
2. Introduction to sensors- John veteline, aravind raghu, CRC press,2011

REFERENCES

1. Sensors and Actuators , D. Patranabis ,2nd Ed., PHI, 2013.
2. Make sensors: Terokarvinen, kemo, karvinen and villey valtokari, 1st edition, maker media, 2014.
3. Sensors handbook- Sabrie soloman, 2nd Ed. TMH,2009.

MICROWAVE ENGINEERING LABORATORY

B.Tech IV Year I Semester	L	T	P	C
	0	0	2	1

LIST OF EXPERIMENTS

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Magic T Characteristics.
4. Circulator Characteristics.
5. Attenuation measurement.
6. Directional coupler Characteristics.
7. Scattering parameters of wave guide components.
8. Frequency measurement.
9. Direct Frequency measurement.
10. Slot Section Frequency measurement.
11. Impedance measurement.
12. VSWR measurement.

MANAGEMENT FUNDAMENTALS FOR ENGINEERS

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Course Objective

To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

Course Outcome

The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

UNIT I
Introduction to Management
Evolution of Management, Nature & Scope-Functions of Management-Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process-Types of Plans-MBO.

UNIT II
Organization Structure & HRM
Organization Design-Organizational Structure-Departmentation–Delegation-Centralization - Decentralization-Recentralization-Organizational Culture- Organizational climate-Organizational change.
Human Resource Management-HR Planning - Recruitment & Selection - Training & Development-Performance appraisal - Job satisfaction-Stress Management Practices.

UNIT III
Operation Management
Introduction to Operations Management-Principles and Types of Plant layout-Methods of production (Job Batch and Mass production) - Method study and Work measurement-Quality Management - TQM-Six sigma - Deming's Contribution to Quality - Inventory Management – EOQ - ABC Analysis - JIT System-Business Process Re-engineering(BPR).

UNIT IV
Marketing Management
Introduction to Marketing-Functions of Marketing-Marketing vs. Selling-Marketing Mix - Marketing Strategies - Product Life Cycle - Market Segmentation -Types of Marketing - Direct Marketing-Network Marketing - Digital Marketing-Channels of Distribution - Supply Chain Management (SCM).

UNIT V
Project Management
Introduction to Project Management-steps in Project Management - Project Planning - Project Life Cycle-Network Analysis-Program Evaluation & Review Technique(PERT)-Critical Path Method(CPM) - Project Cost Analysis - Project Crashing - Project Information Systems.

Suggested Readings

1. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
2. Fundamentals of Management, Stephen P.Robbins, Pearson Education, 2009.
3. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
4. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
5. Industrial Engineering and Management: Including Production Management, T.R.Banga, S.C Sharma , Khanna Publishers.

RADAR SYSTEMS
(PE -5)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite - Analog and Digital Communications

Course Objectives

1. To explore the concepts of radar and its frequency bands.
2. To understand Doppler effect and get acquainted with the working principles of CW radar, FM-CW radar.
3. To impart the knowledge of functioning of MTI and Tracking Radars.
4. To explain the deigning of a Matched Filter in radar receivers.

Course Outcomes

Upon completing this course, the student will be able to

1. Derive the complete radar range equation.
2. Understand the need and functioning of CW, FM-CW and MTI radars.
3. Known various Tracking methods.
4. Derive the matched filter response characteristics for radar receivers.

UNIT I
Basics of Radar
Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation.

Radar Equation
SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets , Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment).

UNIT II
CW and Frequency Modulated Radar
Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar
Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter.

UNIT III
MTI and Pulse Doppler Radar
Principle, MTI Radar - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT IV

Tracking Radar

Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT V

Detection of Radar Signals in Noise

Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receivers

Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

TEXT BOOKS

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007.

REFERENCES

1. Radar: Principles, Technology, Applications – Byron Edde, Pearson Education, 2004.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.
3. Principles of Modern Radar: Basic Principles – Mark A. Richards, James A. Scheer, William A. Holm, Yesdee, 2013.
4. Radar Handbook - Merrill I. Skolnik, 3rd Ed., McGrawHill Education, 2008.

ELECTRO MAGNETIC INTERFERNCE & ELECTROMAGNETIC COMPATIBILITY (EMI / EMC)
(PE 5)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite - Electromagnetic Theory and Transmission Lines

Course Objectives

1. To introduce important system concepts such as Electromagnetic interference and Electromagnetic compatibility (EMI&EMC).
2. To familiarize with unavoidable and naturally happening sources of EMI and problems to ensure EMC.
3. To study various techniques to reduce EMI from systems and to improve EMC of electronic systems.

Course Outcomes

Upon completion of this course, the student will be able to

1. Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.
2. Analyze various sources of EMI and various possibilities to provide EMC.
3. Understand and analyze possible EMI prevention techniques such as grounding, shielding, filtering and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.

UNIT I
Sources of EMI
Definition of EMI and EMC, Classification, Natural and Man-Made EMI Sources, Switching Transients, Electrostatic Discharge, Nuclear Electromagnetic Pulse and High Power Electromagnetics.

EMI/EMC Standards
Introduction, Standards for EMI/EMC – MIL –STD 461/462 – IEEE/ANSI Standards – CISPR/IEC, Standards – FCC Regulations.

UNIT II
EMI Coupling Modes
Penetration: Introduction, Shielding Theory - Shielding Effectiveness, The Circuit Approach, The Wave Approach, Aperture Theory, Calculation of Effectiveness of a Conducting Box with an Aperture, Introduction to Propagation and Cross Talk – Introduction, Basic Principles, Determination of EM Field from Transmission Lines.

UNIT III
EMI Controlling Techniques-1
Grounding, Principles and Practice of Earthing, Precautions in Earthing, Measurements of Ground Resistance, System Grounding for EMC, Cable Shielding Grounding.
Shielding, Theory and Effectiveness, Materials, Integrity at Discontinuities, Conductive Coatings, Cable Shielding, Effectiveness Measurements, Electrical Bonding.

UNIT IV

EMI Controlling Techniques-2

Characteristics and Types of Filters – Impedance Mismatch, Lumped Element Low-Pass, High-Pass, Band-Pass and Band-Reject Filters, Power Line Filter Design - Common Mode, Differential Mode, Combined CM and DM Filters, Design Example.

EMC Gaskets – Knitted Wire-Mesh Gaskets, Wire-Screen Gaskets, Oriented Wire Mesh, Conductive Elastomer, Transparent Conductive Windows, Conductive Adhesive, Conductive Grease, Conductive Coatings, Isolation Transformers, Opto-Isolators.

UNIT V

EMI Measurements

Introduction to Open Area Test Site Measurements – Measurement Precautions – Open Area Test Site – Terrain Roughness – NSA – Measurement of Test Site Imperfections – Antenna Factor Measurement – Measurement Errors.Radiated Interference Measurements – Anechoic Chamber – TEM Cell – Reverberating Chamber – Ghz TEM Cell – Comparison of Test Facilities – Measurement UncertaintiesConducted Interference Measurements – Characterization – Conducted EM Noise on Power Supply Lines – Conducted EMI from Equipment – Immunity – Detectors and Measurement – Pulsed EMI Immunity – Electrostatic Discharge.

TEXT BOOKS

1. Engineering Electromagnetic Compatibility – V. Prasad Kodali – 2/e – IEEE Press – Wiley India Pvt. Ltd – 2001.
2. Principles and Techniques of Electromagnetic Compatibility – Christos Christopoulos – 2/e – CRC Press (Taylor & Francis Group) – 2007.

REFERENCES

1. Introduction to Electromagnetic Compatibility – Clayton R.Paul – John Wiley & Sons, 1992.
2. Electromagnetic Compatibility of Integrated Circuits – Techniques for Low Emission and Susceptibility – Edited by Sonia Ben Dhia, Mohamed Ramdani and Etienne Sicard – Springer, 2006.
3. EMI reduction in Electronic Systems – Mills – J.P – Prentice Hall Inc.
4. Noise Reduction in Electronic Systems – Henry W.Ott, 2nd Edition, Wiley Interscience, 1988.

OPTICAL COMMUNICATIONS
(PE 5)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: Analog Communications and Digital Communications

Course Objectives

The objectives of the course are:

1. To realize the significance of optical fibre communications.
2. To understand the construction and characteristics of optical fibre cable.
3. To develop the knowledge of optical signal sources and power launching.
4. To identify and understand the operation of various optical detectors.
5. To understand the design of optical systems and WDM.

Course Outcomes

1. At the end of the course, the student will be able to:
2. Understand and analyze the constructional parameters of optical fibres.
3. Be able to design an optical system.
4. Estimate the losses due to attenuation, absorption, scattering and bending.
5. Compare various optical detectors and choose suitable one for different applications.

UNIT I

Overview of Optical Fiber Communication: - Historical development, The general system, Advantages of Optical Fiber Communications, Optical Fiber Wave Guides- Introduction, Ray Theory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Cylindrical Fibers- Modes, Vnumber, Mode Coupling, Step Index Fibers, Graded Index Fibers.

Single Mode Fibers- Cut Off Wavelength, Mode Field Diameter, Effective Refractive Index, Fiber Materials Glass, Halide, Active Glass, Chalgenide Glass, Plastic Optical Fibers.

UNIT II

Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses, Information Capacity Determination, Group Delay, Types of Dispersion - Material Dispersion, Wave-Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening, Optical Fiber Connectors- Connector Types, Single Mode Fiber Connectors, Connector Return Loss.

UNIT III

Fiber Splicing: Splicing Techniques, Splicing Single Mode Fibers, Fiber Alignment and Joint Loss- Multimode Fiber Joints, Single Mode Fiber Joints.

Optical Sources- LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Resonant Frequencies, Reliability of LED & ILD.

Source to Fiber Power Launching: - Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

UNIT IV

Optical Detectors: Physical Principles of PIN and APD, Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors, Optical Receiver Operation-Fundamental Receiver Operation, Digital Signal Transmission, Error Sources, Receiver Configuration, Digital Receiver Performance, Probability of Error, Quantum Limit, Analog Receivers.

UNIT V

Optical System Design: Considerations, Component Choice, Multiplexing, Point-to- Point Links, System Considerations, Link Power Budget with Examples, Overall Fiber Dispersion in Multi-Mode and Single Mode Fibers, Rise Time Budget with Examples.
Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

TEXT BOOKS

1. Optical Fiber Communications – Gerd Keiser, TMH, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education, 3rd Edition, 2009.

REFERENCES

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Introduction to Fiber Optics by Donald J.Sterling Jr. – Cengage learning, 2004.
5. Optical Communication Systems – John Gowar, 2nd Edition, PHI, 2001.

SATELLITE COMMUNICATIONS
(PE-6)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite Analog and Digital Communications

Course Objectives

1. To acquired foundation in orbital mechanics and launch vehicles for the satellites.
2. To provide basic knowledge of link design of satellite.
3. To understand multiple access systems and earth station technology.
4. To understand the concepts of satellite navigation and GPS.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles.
2. Envision the satellite sub systems and design satellite links for specified C/N.
3. Understand the various multiple access techniques for satellite communication systems and earth station technologies.
4. Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation.

UNIT I

Introduction

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers

Orbital Mechanics, Look Angle determination, Orbital Perturbations, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance.

UNIT II

Satellite Subsystems

Attitude and Orbit Control System, Telemetry, Tracking, Command And Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

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, System Design Examples.

Multiple Access

Frequency Division Multiple Access (FDMA), Inter modulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

UNIT IV

Earth Station Technology

Introduction, Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Primary Power Test Methods.

UNIT V

Low Earth Orbit and Geo-Stationary Satellite Systems

Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

Satellite Navigation & Global Positioning System

Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.

TEXT BOOKS

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Ed., 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Ed., Pearson Publications, 2003.

REFERENCES

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Ed., 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 4th Ed., 2009.

NANO MATERIALS AND TECHNOLOGY
(PE – 6)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Course Objectives

1. This Course is intended to cover the basics of Nano Materials and Technology
2. To know the scaling of the devices to smaller and smaller sizes which has provided the basis for growth.
3. To understand the physical and technological processes for Nano devices.

Course Outcomes

After completion of the course the student will be able to

1. Understand the basic concepts of Nano materials and Nano technology.
2. Familiar with fabrication process of Nano Technology.
3. Known the scaling and role of electrons in solids and Nano Structures.
4. Known the structures of Nano Devices.

UNIT I

Nanotechnology

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Precipitation, Combustion Methods; Top-Down Fabrication: Chemical Vapor Deposition, Physical Vapor Deposition.

UNIT II

Nano Materials

Semiconductors, Crystal lattices: bonding in crystals, Electron energy bonds, Semiconductor hetero-structures, Lattice-matched and pseudomorphic hetero-structures, Organic semiconductors, Carbon Nano materials: Nano Tubes and fullerenes.

UNIT III

Nanostructures

Bulk crystal and hetero-structure growth, Nanolithography, etching and other means for fabrication of Nanostructures and Nano devices, Techniques for characterization of Nanostructures, spontaneous formation and ordering of nanostructures, Clusters and Nano crystals, Methods of Nano tube growth, Chemical and biological methods for Nano scale fabrication, Fabrication of Nano electro-mechanical systems.

UNIT IV

Electron transport in semiconductors and nanostructures

Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructure, density of states of electrons in nanostructures, Electron transport in nanostructures, Electrons in quantum - wells, wires and dots.

UNIT V

Nanostructure devices

Resonant-tunneling diode, Field-effect transistors, Single-electron-transfer devices, Potential-effect transistors, Light-emitting diodes and lasers, Nano-electro-mechanical system devices, Quantum-dot cellular automata.

TEXT BOOKS

1. Introduction to Nano electronics: Science, Nanotechnology, Engineering and Applications, Vladimir V, Mitin, Viatcheslav A. Kochelap and Michael A. Stroscio, Cambridge University Press.

REFERENCES

1. Fundamentals of Nano electronics by George W Hanson, Pearson Publications, 2008.
2. Introduction to Nanotechnology by Charles P Poole Jr and Frank J Owens Wiley.

TELEVISION ENGINEERING
(PE - 6)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Objectives

1. Study the different camera and picture tubes.
2. Know about various standard TV channels.
3. Study about TV receiver, sync separation, detector etc.,
4. Study about color signal encoding, decoding and receiver.

Course Outcomes

Upon completing this course, the student will be able to

1. Known working principle and construction of various camera tubes.
2. Understand the concept of TV transmission and reception.
3. Understand the working of color TV.
4. Learn the basics of various digital TV systems.

UNIT I
Introduction
TV transmitter and receivers, synchronization. Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal, TV standards. Camera tubes: image Orthicon, Plumbicon, vidicon, silicon Diode Array vidicon, Comparison of camera tubes, Monochrome TV camera,

TV Signal Transmission and Propagation
Picture Signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW,TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

UNIT II
Monochrome TV Receiver
RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits, AGC, noise cancellation, video and inter carrier sound signal detection, vision IF subsystem of Black and White receivers, Receiver sound system: FM detection, FM Sound detectors, and typical applications.

UNIT III
Sync Separation and Detection
TV Receiver Tuners, Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions. Sync Separation, AFC and Deflection Oscillators: Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses. AFC, single ended AFC circuit, Deflection Oscillators, deflection drive Ics, Receiver Antennas, Picture Tubes.

UNIT IV

Color Television

Color signal generation, additive color mixing, video signals for colors, color difference signals, encoding, Perception of brightness and colors luminance signal, Encoding of color difference signals, formation of chrominance signals, color cameras, Color picture tubes.

Color Signal Encoding and Decoding

NTSC color system, PAL color system, PAL encoder, PAL-D Decoder, chrome signal amplifiers, separation of U and V signals, color burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and color killer circuits, U& V demodulators.

UNIT V

Color Receiver

Introduction to color receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Color, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.

Digital TV

Introduction to Digital TV, Digital Satellite TV, Direct to Home Satellite TV, Digital TV Transmitter, Digital TV Receiver, Digital Terrestrial TV, LCD TV, LED TV, CCD Image Sensors, HDTV.

TEXT BOOKS

1. Monochrome and Color TV- R.R. Gulati, New Age International Publication, 2002.
2. Television and Video Engineering- A.M.Dhake, 2nd Ed., McGraw Hill,2017.

REFERENCES

1. Color Television Theory and Practice-S.P.Bali, TMH, 1994.
2. Basic Television and Video Systems-B.Grob and C.E.Herndon, McGraw Hill, 1999.
3. Modern Television Practice – Principles, Technology and Service- R.R.Gallatin, New Age International Publication, 2002.

PRINCIPLES OF COMMUNICATIONS
(OE- 3)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Objectives

1. Basic understanding of all communication systems
2. Introduce the basic definitions of different modulation techniques.
3. Known about satellite and optical communications.
4. Learn the fundamentals of wireless technologies.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand the need of modulation and distinguish various modulation techniques.
2. Known the communication concepts using satellite and optical fiber.
3. Have a basic understanding of cellular, mobile and telephone communication systems.
4. Known fundamentals of wireless networks.

UNIT I
Simple description on Modulation
Need for Modulation, Electromagnetic spectrum, Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

UNIT II Satellite Communication
Satellite Orbits, Ground Stations, Satellite Applications, basics of Global Positioning systems.

UNIT III
Optical Communication
Propagation mechanism, Types of optical fiber, LED source, PIN detector

UNIT IV
Telecommunication Systems
Telephone system, Paging systems, Internet Telephony.

Networking and Local Area Networks
Network fundamentals, Ethernet LANs, Token Ring LAN.

UNIT V
Cellular and Mobile Communications
Basic concepts of Cellular telephone systems, Evolution and standard - AMPS, GSM, CDMA, and WCDMA.

Wireless Technologies
Fundamentals - Wireless LANs, PANs and MANs.

TEXT BOOKS

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Kennedy, Davis, Electronic Communications systems, 4e, TMH, 1999.

REFERENCES

1. Tarmo Anttalainen, Introduction to Telecommunications Network Engineering, Artech House Telecommunications Library.
2. Theodore Rappaport, Wireless Communications-Principles and practice, Printice Hall, 2002.
3. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
4. Wayne Tomasi, Introduction to data communications and networking, Pearson Education, 2005.