Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Electronics & Telecommunication) Sem – III (2014 Course)

Sr.No.	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
					End Semester Exam	Continuous Assessment			TW & PR	TW & OR				
		L	P	T		Unit Test	Assignment	Attendance				Theory	TW	Total Credits
1	Engineering Mathematics-III	3	0	1	60	20	10	10	-	-	100	3	1	4
2	Electronic Devices and Applications	4	2	0	60	20	10	10	50	-	150	4	1	5
3	Signals & Systems	3	0	1	60	20	10	10	-	50	150	3	1	4
4	Digital Circuits & Applications	3	2	0	60	20	10	10	50	-	150	3	1	4
5	Network Theory	3	2	0	60	20	10	10	50	-	150	3	1	4
6	Professional Skill Development-III	4	0	0	100	--	--	--	--	-	100	4	0	4
	Total	**20**	**6**	**2**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**05**	**25**

Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Electronics & Telecommunication) Sem – IV (2014 Course)

Sr. No	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
					End Semester Exam	Continuous Assessment			TW & PR	TW & OR				
		L	P	T		Unit test	Assignment	Attendance				Theory	TW	Total Credits
7	Linear Integrated circuits	3	2	0	60	20	10	10	50	-	150	3	1	4
8	Applied Electronic circuits	4	2	0	60	20	10	10	50	-	150	4	1	5
9	Control System Engineering	3	2	1	60	20	10	10	-	-	100	3	2	5
10	Analog Communication System	3	2	0	60	20	10	10	-	50	150	3	1	4
11	Data Structures and Files	2	2	0	60	20	10	10	-	50	150	2	1	3
12	Professional Skill Development-IV	4	0	0	100	-	-	-	-	-	100	4	0	4
	Total	**19**	**10**	**1**	**400**	**100**	**50**	**50**	**100**	**100**	**800**	**19**	**06**	**25**

Total Credits Sem – III : 25

Total Credits Sem – IV : 25

Grant total : 50

B.Tech.(E&TC) Sem-III

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B. Tech (E & TC) Sem:- III

SUBJECT: - Engineering Mathematics-III

Lecture: 3 hours/week	**Theory: 60 marks**
Tutorial: 1 hours/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignments: 10 marks

Course prerequisites:

Students should have basic knowledge of:

- Differential calculus
- Integral calculus
- Complex numbers
- Vector algebra

Course objective:

To develop ability to use the mathematical techniques, skills, and tools necessary for engineering practice.

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

1. Form mathematical modeling of systems using differential equations and ability to solve linear differential equations with constant coefficient.
2. Apply basics of analytic functions and the basics in complex integration which is used to evaluate complicated real integrals.
3. Apply theorems to compute the Laplace transform, inverse Laplace transforms.
4. Solve difference equation by Z-transform.
5. Calculate the gradients and directional derivatives of functions of several variables.
6. Use Green's theorem to evaluate line integrals along simple closed contours on the plane.

Contents:

Unit-I

Linear Differential Equations (LDE) **(08Hours)**

Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's &Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits.

Unit-II

Complex Variables **(08Hours)**

Functions of Complex Variables, Analytic Functions, C-R Equations, Conformal Mapping, Bilinear Transformation, Cauchy's Theorem, Cauchy's Integral Formula, Laurent's Series, Residue Theorem

Unit-III

Transforms **(08Hours)**

Fourier Transform (FT): Complex Exponential Form of Fourier Series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses. Introductory Z-Transform (ZT): Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations.

Unit-IV

Laplace Transform (LT) **(08Hours)**

Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special functions viz., Periodic, Unit Step, Unit Impulse, ramp, jump, . Problems on finding LT & inverse LT. Applications of LT and Inverse LT for solving ordinary differential equations.

Unit -V

Vector Differential Calculus **(08Hours)**

Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities.

Unit-VI

Vector Integral Calculus **(08Hours)**

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem, Applications to Problems in Electro-Magnetic Fields.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Assignments:

1. Linear Differential Equations
2. Complex Variables
3. Transforms
4. Laplace Transform
5. Vector Differential Calculus
6. Vector Integral Calculus

Text Books:

1. Advanced Engineering Mathematics by Peter V. O'Neil (Cengage Learning).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).

Reference Books:

1. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill).
2. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
3. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
4. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
5. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E & TC) Sem:- III

SUBJECT: - Electronic Devices and Applications
Alternative Name
(Electronic Devices & Applications)

Lecture: 4 hours/week
Practical: 2 hours/week

Theory: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignments: 10 marks
TW & Practical.: 50 marks

Course prerequisites:

- Knowledge of EEE.

Course objective:

1. To make student understand working of bipolar junction transistor and field effect transistor with different biasing techniques
2. To make student understand a practical approach of design and analysis of waveshaping circuits using diode and multivibrator using transistors
3. To make student understand working of FET and MOSFET and its applications
4. To make student understand working of optoelectronic devices and its applications.
5. To make student understand the fabrication process of PCB

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

1. Demonstrate knowledge of working and applications of diode.
2. Demonstrate knowledge of working of BJT with different biasing techniques.
3. Analyze applications of BJT as an amplifier and multivibrator.
4. Explain working of FET and MOSFET and its applications.
5. Demonstrate knowledge of working of optoelectronic devices.
6. Design, built and test any small electronic circuit on PCB.

Contents:

Unit-I

Transistor Biasing **(08Hours)**

Need of biasing, DC load line analysis, operating point, Thermal runaway. Different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, stability factor for all biasing circuits, Design of biasing circuits, Compensation techniques: Thermistor and diode compensation, Thermal Resistance

Unit-II

BJT Amplifiers **(08Hours)**

Two port device and Hybrid model , transistor Hybrid model, h- parameters, Simplified CE Hybrid Model, Analysis of amplifiers using Approximate Model(CE, CC, CB), BJT Single Stage Amplifiers, Small Signal Analysis of Single Stage BJT Amplifiers, Distortion in Amplifiers, Application of Transistor as a Switch

Unit-III

Field Effect Transistor (FET) **(08Hours)**

Types of FET viz. JFET,MOSFET, JFET -construction, VI characteristics, transfer characteristics, Characteristics Parameters of JFET, FET Biasing(Self Bias, Fixed Bias, Current Source Bias), JFET amplifiers-CS,CD and CG amplifiers, Application of FET.

Unit-IV

MOSFETs **(08Hours)**

Typesof MOSFET viz. DMOSFET,EMOSFET,n-MOS,p-MOS and CMOS devices, DMOSFET and EMOSFET characteristics and parameters,non-ideal V-I characteristics viz. finite output resistance,body effect,subthreshold conduction ,breakdown effects and temperature effects,MOSFET biasing, MOSFET as VLSI device

Unit -V

Wave shaping and Multivibrator Circuits **(08Hours)**

Diode as clipper- series and parallel forms of clipper circuits, biased clipper, their operations and transfer characteristics, Diode as a clamper, voltage multiplier circuits-voltage doubler,

tripler and quadruple configuration , Multivibrator circuits-astable and monostable multivibrator circuits using BJT

Unit-VI

Optoelectronics devices and PCB design (08Hours)

Construction, V-I characteristics and applications of LED, LDR, Photodiode, Phototransistor, Photoconductive cell, Photovoltaic cell, optcoupler

PCB: types of PCB, PCB design rules, layout design, artwork design, fabrication process of single sided PCB, different copper clad laminates, composition of solder metal

List of Experiments:

1. Biasing techniques of BJT- to find stability factor of self bias, collector to base bias, fixed bias
2. To plot frequency response of single stage CE amplifier and find its bandwidth
3. To plot frequency response of single stage FET amplifier (CS/CD configuration)and find its bandwidth
4. To study different types of Clipper circuits
5. To study different types Clamper circuits
6. To study Astable mulitivibrator using BJT
7. To study monostable mulitivibrator using BJT
8. To plot transfer characteristics of Optocoupler
9. To plot V-I and optical characteristics of LED and LDR
10. To plot V-I and optical characteristics of Photodiode and phototransistor
11. To design, built and test any electronic circuit based on above syllabus.

Assignments:

1. Distinguish Biasing techniques of BJT- self bias, collector to base bias, fixed bias
2. Derive the equations for A_v, A_{vs}, A_c, A_{cs}, Z_i, Z_o for CE, CB and CC configurations of n-p-n transistor.
3. Draw the construction of JFET and explain operation of JFET in Fixed bias, Self bias and voltage divider bias.
4. Draw the construction of D-MOSFET, E-MOSFET and explain input, Output, transfer Characteristics
5. Draw the circuits for clipper, clamper, and voltage multiplier and explain their operations.

6. Design and test BJT amplifier/FET amplifier/Voltage multiplier/Multivibrators circuit on PCB
7. Visit to local Electronics Market

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

3. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
4. End term Examination

Text Books:

1. "Electronic Devices and Circuits" by S. salivahanan,Suresh kumar- Mc Graw Hill Publication
2. "Integrated Electronics", by Millman J and Halkias .C., TMH publication
3. "Electronic Devices and Circuits " by Millman ,Halkies,TMH publication

Reference Books:

4. "Electronic Devices and Circuits" by Allen Mottershed- PHI Publication
5. "Electronic Devices and Circuits" by J.B. Gupta-Katson educational series
6. "Microelectronics "by Jacob Millman, Arvin Garbel- Mc Graw Hill Publication
7. "Printed Circuits Handbook " by Clyde F. Coombs - McGraw Hill Handbooks
8. "Microelectronic Circuits Theory and applications "by Adel S. Sedra , Kenneth C. Smith- Oxford

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E&TC) Sem:- III

SUBJECT: - Signals and Systems

Lecture: 3 Hrs/week

Tutorial: 01 Hrs/Week

Theory: 60 marks

Unit Test: 20 Marks
Attendance: 10Marks
Assignments: 10Marks
TW & Oral: 50Marks

Course prerequisites:

Knowledge of Engineering Mathematics-I, Engineering Mathematics-II and Engineering Mathematics-III course.

Course objective:

The course aims to introduce the basic concepts of signals and systems analysis and their tools in the time and frequency domain. It also provides knowledge of correlation function and sampling.

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

1. Characterize and analyze the properties of signals.
2. Classify the systems and analyze in time domain using convolution.
3. Apply Fourier transform, Laplace transform and Z-Transform for analysis of LTI systems.
4. Conceptualize the effects of sampling on signal and describe the auto correlation and cross correlation between signals.

Contents:

Unit-I

Introduction to signals **(06 Hours)**

Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic, deterministic & non-deterministic, energy & power, elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal, basic operations on signals.

Unit-II

Classification of Discrete time systems (06 Hours)

Definition ,Classification of System, System Interconnections, state space analysis, Linear & non -linear ,Time-Invariant & Time variant, causal & non-causal, static & dynamic, stable & unstable systems, stability & impulse response of systems to standard signals.

LTI system Analysis: Introduction to LTI systems. Block Diagram, Linear Convolution-Convolution Integral, Impulse response, Methods of Convolution. Properties of convolution

Unit-III

Continuous Time system Analysis: (06 Hours)

Response of LTI Systems to exponential signals, periodic signals. Fourier series, Fourier Transforms, properties, application of Fourier series & Fourier transforms to the system analysis.

Unit-IV

Laplace Transform and Applications (06 Hours)

Laplace Transform: Definition and its properties, ROC and pole zero concept. Application of Laplace transforms to the LTI system analysis. Inversion using duality, numerical based on properties.

Unit-V

Z-Transform and Applications (06 Hours)

Z-Transform: Definition and its properties, The Region of Convergence for the Z-Transform, the Inverse z-Transform, Application of Z-Transform to the LTI system analysis

Unit VI:

Correlation and Spectral Density (06 Hours)

Definition of Correlation and Spectral Density, correlogram, analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation,

energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density, Sampling theorem & its proof, aliasing, reconstruction of sampled signals, interpolation.

Assignments:

1. Classify and explain any 5 signals that occur physical world.
2. Explain LTI system by giving a real world example.
3. Find the Fourier Transform using MATLAB.
4. Find the Laplace Transform using MATLAB.
5. Find the Z-Transform using MATLAB.
6. Find the autocorrelation of sine sequence x[n] with frequency 50Hz and sampling frequency 200Hz, using MATLAB. If the given signal x[n] is affected by noise signal z[n], such that y[n] = x[n] + z[n], find the cross correlation between x[n] and y[n], using MATLAB.

Content Delivery Methods: Chalk & talk, Power point presentation, MATLAB

Assessment Methods:

1. Continuous Assessment (Attendance, Assignments/Tutorials, Unit Test)
2. End term Examination

Text Books:

1. Roberts M. J., Signals & Systems, TMH
2. Oppenheim, Wilsely & Nawab, Signals & Systems, MGH

Reference Books:

1. B.P.Lathi, Signal Processing & Linear Systems, Berkeley Cambridge, 1998 Edition

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E & TC) SEM: - III
SUBJECT: - Digital Circuits and Applications

Lecture: 3 Hours/Week

Practical: 2 Hours/Week

Theory: 60 marks

Unit Test: 20 Marks
Attendance: 10Marks
Assignments: 10Marks

TW& Practical: 50 Marks

Course Prerequisite:

1. Fundamentals of Number Systems.

Course Objective:

1. To understand principles, characteristics & operations of combinational & sequential logic circuits.
2. To design combinational circuits by using logic gates, MSI circuits, PLDs.
3. To design, implement analyze, asynchronous & synchronous sequential circuits using flip flops.

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

1. Demonstrate the knowledge of Boolean algebra including simplification techniques.

2. Describe the characteristics of Logic families TTL, CMOS, ECL & explain the fundamentals of semiconductor memories.

3. Analyze & design digital combinational circuits such as of multiplexers, demultiplexers, encoder, decoder and arithmetic circuits.

4. Demonstrate the knowledge of operations of basic types of flip-flops, registers, counters & the design of FSM.
5. Describe the characteristics of PLDs, Semiconductor memories and their applications.

Contents:

Unit –I

Binary Number Systems & Coding (6 Hours)

Review of Binary number system: Binary addition and subtraction using 1's, 2'scomplement method, sign magnitude representation. BCD codes, 8421, Excess –3, Grey code, codes with more than four bits, ASCII code.

Principles of combinational logic

Fundamental theorems of Boolean algebra, Canonical and standard forms (SOP and POS), minimization of logic functions, Karnaugh maps up to 4 variables, Don't care conditions, Quine Mc-Cluskey method.

Unit-II

Arithmetic modules (6 Hours)

Adder, subtractor, carry look ahead adder, BCD adder, magnitude comparator, Excess-3 Adder, series and parallel adder, ALU.

Combinational Logic modules

Code conversion, Multiplexer, Demultiplexer, Encoder, Decoder and their applications. Parity generator and checker.

Unit-III

Logic Families (6 Hours)

Parameter definitions - Noise margin, power dissipation, voltage and current parameters, propagation delay. Typical values for TTL, CMOS & ECL. Two input TTL NAND gate, TTL logic families standard, Totem – pole, open collector, tri-state (concept & application). TTL-CMOS/CMOS-TTL interfacing, comparison of TTL & CMOS ECL.

Unit-IV

Sequential Logic systems (7 Hours)

Basic sequential circuits-latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, MS J-K flip flop, T flip-flop.

Definition of state machines, Moore and Mealy machine, state machine as a sequential controller. Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization. Designing state machine using ASM charts, using state diagram, sequence detector and design examples.

Unit-V **(5 Hours)**

Application of Flip flops

Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock Skew, Clock jitter.

Unit-VI **(6 Hours)**

PLDs & Semiconductor Memories: Programmable logic devices

Study of PROM, PAL, PLAs. Designing combinational circuits using PLDs.

Semiconductor memories

Classification and characteristics of memory, different types of RAMs, ROMs and their applications, Double Data Rate RAMs.

List of Experiments:

Hardware Experiments:

1. Implementation of Boolean functions using logic gates
2. Study of characteristics of typical 74 TTL / 74 CMOS family like: fan in, fan out standard load , noise margin & interfacing with other families
3. Half, Full Adder and subtractor using gates and IC's
4. Code conversion using digital IC's
5. Function implementation using Multiplxer and Demultiplexer
6. Sequence generator using MSJK flip flop IC's
7. Study of counters : Ripple , Synchronous , Ring , Johnson , Up-down counter and its application
8. Study of shift registers : Shift left , Shift right , parallel loading and Pulse Train generator
9. BCD Adder/Subtractor with Decoder driver and 7 segment display

Software Experiments:

Perform following experiments using Xilinx ISE simulator

1. Full Adder using half adder
2. 2 bit comparator

Assignments:

1. Solve four examples of Boolean expressions using K-maps, Quine-McClusky method using both minterms and maxterms.
2. Design carry look Ahead adder for adding two 4-bit numbers.
3. Design sequence detector using FSM and implement using suitable flip flops.
4. Design 4-bit/ 5-bit ripple counters, synchronous counters for positive edge/ negative edge triggered flip flops.
5. Study any CPLD/ FPGA board and make a report on the features of the board.
6. Study ISE of any platform(Xilinx, Quartus, Libero etc.) and make a report on working of the platform.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Attendance, Assignments/Tutorials, Unit Test)
2. End term Examination

Text Books:

1. R.P. Jain , "Modern digital electronics" , 3rdedition , 12th reprint TMH Publication, 2007.
2. Anand Kumar 'Fundamentals of Digital Circuits'--. PHI

Reference Books :

1. J.F.Wakerly "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2004.
2. A.P. Malvino, D.P. Leach 'Digital Principles & Applications'' –Vith Edition-Tata Mc Graw Hill, Publication.
3. Morris Mano 'Digital Design'-- (Third Edition),.PHI

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics &Telecommunication Engineering

Class: B.Tech (E&TC) Sem:- III

SUBJECT: - Network Theory

Lecture: 3 hours/week
Practical: 2 hours/week

Theory: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignments: 10 marks
TW & Practical: 50 marks

Course prerequisites:

- Knowledge of KCL and KVL Laws from Basic Electrical Engineering
- Knowledge of Linear Differential Equations and Systems of Linear Equations from Engineering Mathematics - I and II.

Course objective:

The objective of the course is to enable the student to perform any of the network analysis task required in the subsequent courses. The student is exposed to some concepts in graph theory for providing a good foundation for the methods of Mesh Analysis and Node Analysis. The transient analysis using Laplace Transforms is also included. The series and parallel resonance circuits which occur quite frequently in electronics are analyzed. The topic of constant K filter is included as it finds many applications in electronic design. The two port network parameters which are of fundamental importance in many courses on electronic devices are included in the last unit.

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

1. To find voltages and currents in a given network using Mesh Analysis or Node Analysis or Network Theorems.
2. To find voltages and currents in a given network by formulating network equilibrium equations from graph theory.

3. To find the transient response in a given network consisting of series or a parallel combination of resistance, capacitance and inductance.
4. To find all the parameters relating to a given series or a parallel resonant circuit.
5. To design a constant K prototype low pass, high pass, band pass or a band stop passive filter
6. To find any of the two port parameters of a given two port network.

Contents:

Unit I

Basic Circuit Analysis and Simplification Techniques (6 Hours)

KCL, KVL, Source Transformation, Source Shifting, Mesh Analysis, Node Analysis, Super Mesh, Super Node, Mesh and Node Analysis in Sinusoidal Steady State

Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Unit II

Graph Theory (6 Hours)

Network Graph, tree, cotree & loops, Incidence Matrix, tie set matrix, cut-set matrix, Formulation of equilibrium equations in matrix form, Solution of resistive and non resistive networks, Principle of Duality

Unit III

Transient Analysis of Basic RC, RL, & RLC Circuits (6 Hours)

Initial Conditions in networks. A procedure for evaluating initial conditions. Solution of step response in RC, RL, RLC circuits using classical method and using Laplace Transform.

Unit IV

Resonance (6 Hours)

Resonant condition, Definition of Quality factor. Finding resonant frequency, impedance at resonance, voltage and current variation with frequency, bandwidth, selectivity, magnification factor for series and parallel resonant circuits. General case of resistance present in both branches of parallel resonant circuit. Comparison of series and parallel

resonant circuits, Applications of resonant circuits, Analysis of some circuits in communication electronics.

Unit V

Passive Filters **(6 Hours)**

Filter Fundamentals, Image impedance, Characteristic impedance, Propagation constant. Constant K prototype for LPF, HPF, BPF and BSF, m-derived LPF, HPF, Terminating half sections, Composite filters, Applications of passive filters.

Unit VI

Two Port Networks **(6 Hours)**

Network Functions, Two port network parameters, Z, Y, H, ABCD and other parameters, Relationships between two-port network parameters, Interconnections of two-ports, Reciprocity and Symmetry conditions, Analysis of some circuits using two port network parameter theory.

Assignments:

i. Determine the currents, voltages and power absorbed in the given branches in any given network by applying mesh and node analysis.
ii. Determine the currents, voltages and power absorbed in the given branches in any given network using the concepts of graph theory.
iii. Carry out transient analysis and determine the voltage and current expressions for a given network containing R, L and C with non zero initial conditions.
iv. Search for circuits which involve series and parallel resonant circuits in the literature on communication electronics and perform resonant circuit analysis.
v. Design a passive LC filter circuit for use in a DC power supply.
vi. Search for circuits involving electronic devices where theory of two port network parameters can be applied and carry out the analysis.

List of Experiments:

1. To verify Thevenin's and Norton's Theorem.
2. To verify Superposition and Reciprocity Theorem.
3. To find resonant frequencies of series and parallel circuit.
4. To plot frequency response of frequency selective network (Twin T or Wein Bridge).
5. To plot frequency response & cut-off frequency of constant-k LPF and HPF.

6. To plot frequency response & cut-off frequency of constant-k BPF and BSF.
7. To find Z and Y parameters of given two port network.
8. To find H and ABCD parameters of given two port network.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. D. Roy Choudhury, 'Network and Systems', New Age International Publishers, Second Edition.
2. Franklin F. Kuo, 'Network Analysis and Synthesis', John Wiley & Sons (Second Edition)

References Books:

1. M. E. Van Valkenburg, 'Network Analysis', PHI (3rd Edition)
2. John D. Ryder, 'Networks, Lines and Fields', PHI Learning Pvt. Ltd., Second Edition

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E& TC) Sem:- III

SUBJECT: - Energy Studies

Lecture: 3 hours/week

Theory: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignments: 10 marks

Course prerequisites:

- Basic knowledge of types of sources.
- Basic knowledge of consumption, energy conservation & economic development

Course objective:

This course provides in depth knowledge of energy sector and role of energy sector in nation development.

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

1. Identify potential use of energy sources and justify energy conservation.
2. Evaluate global and Indian energy scenarios.
3. Evaluate energy polices framework.

Contents:

Unit-I

Energy Sources **(06 hours)**

Fossil fuels, nuclear fuels, hydel, solar, wind and bio fuels in India, Energy conservation, Nuclear energy through fission and fusion processes.

Unit-II

Energy Conversion **(06 hours)**

Energy Conversion- Energy conversion from source to utility, Solar, Nuclear, Geothermal, Tide and Wind Energies.

Unit-III

Global Energy Scenario **(06 hours)**

Role of energy in economic development and social transformation, Overall energy demand, availability and consumption, Depletion of energy resources and its impact on economy, Non proliferation of nuclear energy. International energy policies of G-8, G-20, OPEC and European Union countries.

Unit-IV

Indian Energy Scenario **(06 hours)**

Commercial and noncommercial forms of energy, Utilization pattern in the past, present and also future prediction and Sector wise energy consumption.

Unit-V

Energy Policy **(06 hours)**

Energy policy issues at global level, national level and state level, Energy conservation act 2001, Electricity act 2003, Energy pricing and its impact on global variations. Energy policies and development – Case studies on the effect of Central and State policies on the consumption and wastage of energy – Critical analysis – Need for renewable energy policies in India.

Unit-VI

Energy and environment **(06 hours)**

Green house effect – Global warming – Global scenario – Indian Environmental degradation – environmental laws– Water (prevention & control of pollution) Act 1974 – The environmental protection act 1986 – Effluent standards and ambient air quality standards – Latest development in climate change policies & CDM.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. Jose Goldenberg, Thomas Johanson, and Reddy, A.K.N., Energy for Sustainable World, Wiley Eastern,2005.
2. Charles E. Brown, World Energy Resources, Springer Publication, New York, 2002.
3. Culp, A.W., Principles of Energy Conversion, McGraw Hill New York, 2004.

Reference Books:

1. Bukhootsow, B., Energy Policy and Planning, Prentice Hall of India, New Delhi, 2003.
2. TEDDY Year Book, The Energy Research Institute (TERI), 2011.
3. International Energy Outlook, EIA Annual Publication, 2011.

B.Tech.(E&TC) Sem-IV

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E & TC) Sem:- IV

SUBJECT: - Linear Integrated Circuits

Lecture: 3 hours/week
Practical: 2 hours/week

Theory: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignments: 10 marks
TW & Oral: 50 marks

Course prerequisites:

- Knowledge of KCL and KVL Law
- Basic knowledge of Op-Amp and its configurations

Course objective:

This course provides in depth knowledge on the Op-Amp. Also it introduces the design of PLL, Waveform generators, Timer IC's and Converters.

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

1. Design linear and nonlinear applications of Op-Amp.
2. Design of first and second order active filters.
3. Analyze and design Waveform Generators.
4. Demonstrate knowledge of Phase Locked Loop IC 565 and Converters.
5. Design of multivibrators using Timer IC 555

Contents:

Unit-I

Introduction to op–amp **(06 hours)**

Block diagram representation of a typical op-amp, Schematic symbol for op-amp ,Definition of integrated circuits ,Types of Integrated Circuits ,Manufacturers ,Designation for IC ,IC package types ,PIN identification & temp ranges , Ordering information, Characteristics of an op-amp, Internal &external offset voltage compensation, Frequency Response of an op-amp.

Unit-II

Linear applications of op-amp **(06 hours)**

Inverting amplifier, Non-inverting amplifier, Voltage Follower, Adder, Subtractor, Scaling averaging amplifier, Integrator, Differentiator, Instrumentation amplifier using 1, 2 and 3 op-amps, Instrumentation amplifier using transducer bridge, Peaking amplifier

Unit-III

Non-linear applications of op-amp **(06 hours)**

Precision half wave rectifier & full wave rectifier, comparator, Schmitt trigger, window detector, log-antilog amplifier and its temperature compensation techniques, log ratio, sample and hold circuit.

Unit-IV

Active filters and waveform generators **(06 hours)**

First and second order low pass Butterworth filters, first and second order high pass Butterworth filter, Band pass filter, Band reject filter, All-pass filter, notch filter, Square wave, Triangular wave, Sawtooth wave generator and study of function general or IC 8038. *Design and analysis of RF filters.*

Unit-V

Timer IC 555 and PLL IC 565 **(06 hours)**

IC 555- as Monostable and Astable Multivibrators and its applications.

IC 565- operating principle of Phase Locked Loop IC 565, Applications like Frequency multiplier, FSK and FM detector

Communication applications of PLL: Locking and tracking of frequency, Co-channel and adjacent channel rejection.

Unit-VI

Converters **(06 hours)**

V to I & I to V converter, D to A converter- Binary weighted resistors and R & 2R resistors, A to D Converter- Counter-ramp type , Successive approximation and Dual Slope.

List of Experiments:

1. To design and build Integrator and draw frequency response
2. To design and build Differentiator and draw frequency response
3. To design and build precision rectifier

4. To design and build schmitt trigger and find threshold levels
5. To design and build first order Butterworth low pass filter
6. To design and build first order Butterworth high pass filter
7. To design and build triangular waveform generator using IC 741
8. To design and build Function generator using IC 8038
9. To design and build Astable multivibrator using timer IC 555.

Assignments:

1. Design of integrator for given frequency and its practical implementation using IC741.
2. Design of Differentiator for given frequency and its practical implementation using IC741.
3. Design of Schmitt Trigger for given frequency and its practical implementation using IC741.
4. Design of LPF and HPF for given cutoff frequency and its practical implementation using IC741.
5. Design of Astable Multivibrator for given frequency and its practical implementation using IC555.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books: References Books:

1. Ramakant Gayakwad, Op Amp & IC's, PHI
2. D. Roy Choudhari, Liner Integrated Circuits, PHI

References Books:

1. K. R. Botkar, Integrated Circuits, khanna Publishers.
2. Clayton, Integrated Circuits, MGH

Note: Topics added in Unit –IV and V and shown in Italian font

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E&TC) Sem:- IV

SUBJECT: - Applied Electronic Circuits

Lecture: 4 hours/week

Practical: 2 hours/week

Theory: 60 marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

TW &Practical.: 50 marks

Course prerequisites:

- Knowledge of linear circuit theory
- Basic concept of BJT

Course objective:

1. To make student understand analysis of multistage transistor amplifier.
2. To make student understand a practical approach of design and analysis of feedback amplifiers ,power amplifiers and oscillators
3. To make student understand analysis and design of voltage regulators.
4. To make student understand the behavior of high frequency BJT amplifiers

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

1. Analyze multistage amplifier.
2. Analyze and design feedback amplifier and power amplifier and oscillators
3. Analyze and design voltage regulators.
4. Characterize behavior of high frequency BJT amplifiers.

Contents:

Unit-I

Cascade amplifiers **(08hours)**

Need of Multistage amplifiers, Parameter evaluation such as Ri, Ro, Av, Ai & Bandwidth for general multi stage amplifier, Analysis & design at low frequency & mid frequency of direct coupled, RC coupled, transformer coupled (Two stage) amplifier, Darlington amplifier, cascode amplifier

Unit-II

Negative Feedback amplifiers **(08 hours)**

Concept of feedback, classification of amplifiers, Negative feedback topologies with their block diagram representation, Effect of negative feedback on Input impedance, Output impedance, Gain and Bandwidth with derivation, method of analysis of feedback amplifier, analysis of all feedback topologies.

Unit-III

Power amplifiers **(08 hours)**

classification of power amplifiers - Class A, Class B, Class C, and Class AB. Operation of - Class A with resistive load; Transformer coupled class A Amplifier; Class B Push – pull amplifier ; Class B Complementary symmetry amplifier. Efficiency analysis for Class A transformer coupled amplifier and Class B push – pull amplifier, cross over distortion in power amplifiers, harmonic analysis

Unit-IV

Oscillators **(08 hours)**

Positive feedback, Barkhausen criterion, Classification of oscillators, derivation and analysis of RC oscillators, Wien bridge Oscillators, LC Oscillators for frequency of oscillation, Tuned collector oscillator, Piezo-electric effect in crystals and Crystal Oscillator

Unit-V

Regulators **(08 hours)**

Block schematic of linear regulators, Performance parameters – Load and Line regulations, Ripple rejection, Output resistance Emitter follower regulator, Transistor series regulator,

shunt regulator Study and design of regulators using IC's :78XX,79XX,723,LM317, Method of boosting output current using external series pass transistor. Protection circuits – Reverse polarity protection, over circuit, fold back current limiting, over voltage protection.

Unit-VI

High frequency amplifiers (08hours)

High frequency T model. Common base short circuit current frequency response ,alpha cut-off frequency ,CE short circuit current frequency response, high frequency hybrid π CE model, Amplifier response taking into account source and load resistances.

List of Experiments:

1. CE two-stage amplifier with capacitive coupling
2. Voltage series and current series feedback amplifiers
3. Voltage shunt and current shunt feedback amplifiers
4. Class A,B,C power amplifiers.
5. Class B/AB push – pull/ Complementary Symmetry power amplifier.
6. Class A transformer coupled amplifier
7. RC Oscillators - phase shift and wien bridge
8. LC oscillators – Hartley, Colpitt
9. Linear voltage regulators – series regulator using series pass transistor, shunt regulator using zener diode
10. Fix voltage regulators using IC 78XX &79XX, Adjustable voltage regulators using IC LM317

Assignments:

1. Artwork & layout preparation for any one circuit from above mentioned experiment list.
2. Simulation of the same circuit using Multisim.
3. Design & assemble simulated circuit on the Cu clad PCB.
4. Physical verification of the performance parameters for the designed PCB.
5. Presentation based on comparative analysis of the simulated results and physically verified results for the same circuit.
6. Report submission on the same kit with special components datasheets.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. "Electronic devices and circuits" by S. Salivahanan, Suresh Kumar Vallavaraj, Mc Graw Hill Publication
2. "Electronic devices and circuits "byMillamanHalkies ,TMH publication
3. "Integrated Electronics", by Millman J and Halkias .C., TMH publication

Reference Books:

1. "Electronic Devices and Circuits "by Allen Mottershed- PHI Publication
2. "Electronic Devices and Circuits "by J.B. Gupta-KATSON educational series books
3. Microelectronic Circuits Theory and applications "by Adel S. Sedra, Kenneth C. Smith- Oxford
4. "Microelectronics "by Jacob Millman, Arvin Garbel- Mc Graw Hill Publication
5. Electronic Principles by Albert Malvino and David J Bates, 7 edition, Tata McGraw Hill
6. Basic Electronics by Zbar, Malvino and Miller, 7 edition, Tata McGraw Hill

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E&TC) Sem:- IV

SUBJECT: - Control System Engineering

Lecture: 3 hours/week
Practical: 2 hours/week
Tutorial : 1 hours/week

Theory: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignments: 10 marks

Course prerequisites:

- Basic knowledge of signals.
- Basic mathematical tools like Laplace transform.
- Basic knowledge of software like MATLAB.

Course objective:

This course provides in depth knowledge of the various control systems. Also it introduces the stability of system, transducers, controllers etc.

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

1. Identify various control systems and determine the 'Transfer Function' of a system using block diagram reduction technique and signal flow graph.
2. Measure various Non-electric quantities such as displacement, temperature, angular speed, acceleration etc using suitable transducer.
3. Determine the error in various control systems.
4. Evaluate the stability of a system using Routh's Stability Criterion, root locus and different graphical methods like Bode plot and polar plot.
5. Compare various control actions such as Proportional (P), Integral (I), Derivative (D), PI, PID.

Unit I

Introduction to Control System **(06 Hours)**

Classification of Control System, control problem, Feedback and Non-feedback Systems, Transfer Function, Block diagram and signal flow graph analysis, Mathematical models of physical system- Electrical & Mechanical System.

Unit II

Transducers **(06 Hours)**

Characteristics, types of transducers, RTD, Thermocouple, Thermister, capacitive transducer, LVDT, strain gauge, flow-meters and level measuring instruments.

Unit III

Time Domain Analysis **(06 Hours)**

Time response of first order & second order system using standard test signal, steady state errors and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system

Unit IV

Stability **(06 Hours)**

Concept of stability, necessary conditions for stability, Hurwitz and Routh stability criteria, and stability of system modeled in state variable form, root locus techniques Effect of Poles and Zeros on the System Stability.

Unit V

Frequency Domain Analysis **(06 Hours)**

Relationship between time & frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist stability criterion.

Unit VI

Controllers and Compensators **(06 Hours)**

Control actions – On/Off, P, PI, PD, PID. PLC Architecture, Introduction to Ladder Diagram, Types of Compensators, Lead, Lag, Lead-Lag Compensators

List of Experiments:

1. Unit Step and Impulse response of the Transfer function using MATLAB.
2. Transient response of second order system
3. To draw Root Locus theoretically and verify it using MATLAB.
4. To draw Bode plot theoretically and verify it using MATLAB.
5. Magnitude and phase plot of Lead network.
6. Magnitude and phase plot of Lag network.
7. To Study characteristics of temperature transducer.
8. To Study characteristics of LVDT for displacement measurement.
9. Study of Strain gauge.
10. To study architecture of PLC.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International Publication
2. Schaum's Series book "Feed back Control Systems".
3. Les Fenical "Control Systems", 1st Edition, Cengage Learning India.

4. R. Anandanatarajan, P. Ramesh Babu , “Control Systems Engineering”, Scitech Publications

Reference Books:

1. Norman S. Nise “Control Systems Engineering”, 4th edition, Wiley edition.
2. Samarjeet Ghosh, “Control Systems Theory & Applications”, 1st edition, Pearson education.
3. S.K. Bhattacharya, “Control Systems Engineering”, 1st edition, Pearson education.
4. Hackworth, “Programmable Logic Controller”, 1st edition, Pearson education.

Assignments:

- Collaboration and discussion is encouraged on home works.
- The submitted MATLAB projects and all take-home quizzes must be individual work.
- Late take-home quizzes/assignments will be accepted, but will be penalized. Some homework problems for each chapter will be assigned but not graded.
- Take-home quizzes, when assigned, will generally be handed out on given date.
- Questions can be directed to the instructor during the tutorial or during office hours.
- In total, some take-home quizzes and a few MATLAB assignments will be assigned.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E&TC) SEM:- IV

SUBJECT: - Analog Communication System

Lecture: 3 hours/week

Practical: 2 hours/week

Theory: 60 marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

TW & Oral: 50 marks

Course prerequisites:

- Basic knowledge of signals and systems.
- Basic mathematical tools like fourier series & transform

Course objective:

1.To introduce to student essential components of communication system and emphasize need of modulation.

2.To make student recognize concept of noise and its effects.

3.To make student understand amplitude & frequency modulation and demodulation and its mathematical background.

4.To make student understand working of radio receivers.

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

1. Describes basic components of communication system and explains need of modulation.

2. Describes concept of noise and also recognizes its effects.

3. Describes amplitude and frequency modulation and demodulation and can do analysis in

Time and frequency domain.

4. Describes components of communication receiver system.

Contents:

Unit-I

Introduction to Communication Systems (4 Hours)

Review of signals and systems, Frequency domain of signals, Block schematic of communication system, types of communication channels, base band signals, RF bands, Necessity of modulation.

Unit-II

Noise (6 Hours)

Types of noise,External noise, Internal Noise, Noise calculations, signal to noise ratio, noise figure, and noise temperature.

Unit-III

Amplitude Modulation (8 Hours)

Amplitude Modulation, low level and high level transmitters,Frequency spectrum of AM wave, Representation of AM, power relations in AM, Generation of AM,DSB suppressed carrier (DSBSC)-modulator, Single Side Band (SSB):-Principle, Filter method, phase shift method and third method, Independent sideband (ISB) and Vestigial Side Band (VSB) principles and transmitters, Diode detector, practical diode detector, and square law detector. Demodulation of DSBSC, Demodulation of SSBSC.

Unit-IV

Angle Modulation (6 Hours)

Basic concept, mathematical analysis, frequency spectrum of FM wave, sensitivity, phase deviation and modulation index, frequency deviation and percent modulated waves, bandwidth requirement, deviation ratio, Narrow Band FM, and Wide Band FM. Varactor diode modulator, FET reactance modulator, stabilized reactance modulator- AFC, Direct FM transmitter, indirect FM Transmitter, pre-emphasis and de-emphasis. Amplitude limiting, FM demodulators.

Unit-V

TRF and Super Heterodyne Radio Receiver (6 Hours)

Block diagram of AM and FM Receivers, TRF receiver, Super heterodyne Receiver, Performance characteristics:Sensitivity, Selectivity, Fidelity, Image Frequency Rejection. IF Amplifiers. Tracking, AGC, Mixers.

Unit -VI

Pulse Analog Modulation (6 Hours)

Pulse modulation. Sampling process,Sampling Theorem for low pass and band pass signals, Nyquist criteria ,

Sampling techniques, aliasing error, and aperture effect. PAM, PWM, PPM generation and detection. TDM and FDM.

List of Experiments (Minimum 08):

1. Study of Amplitude Modulation and Demodulation.

2. Study of Frequency Modulation and Demodulation

3. Study of SSB Modulation & Demodulation.

4. Analysis of standard signals (square and triangular)and Modulated signals(all types of AM, FM) using spectrum analyzer.

5. Sampling And Reconstruction.

6. Study of Pulse Amplitude Modulation (PAM.)

7. Study of Pulse Width Modulation.(PWM)

8. Study of Pulse Position Modulation.(PPM)

9. Study of PAM-TDM.

10. Study of Super heterodyne (AM) Receiver.

Assignments:

1. Discussion is encouraged on home works of Analog Signal Transmission.
2. Design PCB of Modulation and Detection KIT.
3. SSB, DSBSC &VSB Modulation and Detection using Hardware.
4. AM, FM & Superhetrodyne Receivers.
5. PAM, PWM, PPM Modulation and Detection.
6. Visit to Radio station.

(Late take-home quizzes/assignments will be accepted, but will be penalized.)

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)

2. End term Examination

Text Books:-

1. George Kennedy 'Electronics Communication System'- IVth Edition-Tata McGraw Hill Publication.
2. B.P.Lathi 'Modern Digital and analog Communication System' Oxford University press.

Reference Books:-

1. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill.
2. Dennis Roddy, John Coolen.'Electronics Communications 'IVth Edition- Pearson Education

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Department of Electronics and Telecommunication

Class: B.Tech (E&TC) Sem:- IV

SUBJECT: - Data structures and Files

Lecture: 2 hours/week

Practical: 2 hours/week

Theory: 60 marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

TW & Oral: 50 marks

Course prerequisites:

- Basic Knowledge in C programming.

Course objective:

This course provides in depth knowledge of the various types of data structures and various algorithms. Also it introduces the concept of linked list, stack, queues, graph and tree.

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

1. Write a program involving pointers and structures.
2. Write a program involving search and sorting techniques.
3. Write a program using linked and double linked lists.
4. Implement stacks and queues involving linked list.
5. Perform operations on a tree using linked lists.
6. Find the shortest path in a given graph.

Contents:

Unit-I

C Programming Revision **(5 Hours)**

Pointers, Arrays, Single and Multi-Dimensional arrays, Row major and Column Major, Arrays and polynomials, Structures ,Unions, Call by Value ,Call by Reference , Passing arrays ,Passing a function to function, Pointer to function ,Pointers and Structures.

Unit-II

Data Structure and Analysis of algorithms. **(4 Hours)**

Introduction to data structure, Data representation, Abstract Data types, Primitive data types, Data structure and data types, Differences between data types. Program design. Algorithms and different approaches to designing an algorithm, Complexity, Big O notation, algorithm analysis .Recursion. Sorting Bubble sort, Selection sort, Quick sort, Merge sort, Insertion sort.

Unit-III

Linked Lists **(4 Hours)**

Definition, operations on linked list, Reversing the links, Merging of linked lists, Sorting the linked list, Circular Linked list, Recursive operation on linked list, Doubly linked list, Linked list and Polynomials,

Unit-IV

Stack and Queues **(3 Hours)**

Operation on stacks, Stack as an array, Stack as a linked list, Application of stack, Infix to prefix conversion, Infix to postfix conversion, Postfix to prefix conversion, Postfix to infix conversion.

Representation of Queue as an array, Queue as an linked list, Circular Queue, Priority queue

Unit-V

Tree **(3 Hours)**

Binary tree, Linked and array representation of Binary tree, Binary search tree, Operation: Searching of a Node in a Binary tree, Insertion of a node in binary tree, deletion from a binary tree. Threaded binary tree, Forest. AVL trees

Unit-VI

Graphs **(3 hours)**

Definition ,Adjacent vertices and Incident edges, graph representation, adjacency list, depth first search ,breadth first search, Spanning tree, Kruskal.s Algorithm, Shortest path algorithm, Dijkstra.s algorithm.

List of Experiments:

1. Program to create & manipulate database using structure.
2. Program to add two polynomial using array of structure.
3. Program to implement primitive operation on Sequential file.
4. Program to search for record from a given list of records stored in array using
    i) Linear search
    ii) Binary search
5. Program to sort an array of names using
    i) Bubble sort
    ii) Insertion sort
    iii) Quick sort
6. (a) Program to implement following operation on singly linked list:
    i) Create
    ii) Delete
    iii) Insert
    iv) Display
    v) Search
    (b) Program to add two polynomials using linked list.
7. (a) Program to implement stack using:
    i) Array

ii) Linked list

(b) Program to convert an infix expression to postfix expression & evaluate the resultant expression.

8.Program to Implement Queue using: (i) Array (ii) linked list

9.Program to create a Binary search tree & Perform following primitive operation on it:

i) Search

ii) Delete

iii) Traversals (inorder, pre-order, post-order -recursive)

iv) Non-recursive in order traversal

10.Program to create a graph using adjacency list & traverse it using BFS & DPS methods

Assignments:*

1.write a c program to print a 100 year calendar.

2.Write a c program to find color code of a resistor.

3. case study of following topics

a>Chatting Applications (WhatsApp and true Caller)

b>Origin of programming languages

4.library assignments:Comparision of Object oriented programming.

5.Any of the lab experiments.

6.PPT presentation by students.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. "Data structure using C" ISRD group,TMH.
2. "Data Structure through C" ,Yashwant kanetkar,BPB Puplication.

Reference Books:

1. "Data structure using C" AM Tanenbaum, Y Langsam and MJ Augustein, Prentice Hall India.
2. "Data structure and Algorithm Analysis in C" Weiss, Mark Allen Addison Wesley.
3. "Data structure – A Pseudocode Approach with C", Richard F Gilberg Behrouz A. Forouzan, Thomson
4. "Let us C" ,Yashwant Kanetkar,BPB Publication.