Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

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

Sr. No.	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
		L	P	T	End Semester Exam	Continuous Assessment			TW & PR	TW & OR		Theory	TW	Total Credits
						Unit Test	Attendance	Assignments						
15	Engineering Mathematics-III	3	0	1	60	20	10	10	-	-	100	4	-	4
16	Analog Electronics	4	2	0	60	20	10	10	50	-	150	4	1	5
17	Signals & Systems	3	2	0	60	20	10	10	-	50	150	3	1	4
18	Digital Logic Circuits	3	2	0	60	20	10	10	50	-	150	3	1	4
19	Circuit theory	3	2	0	60	20	10	10	50	-	150	3	1	4
20	Professional Skill Development-III	4	0	0	100	0	00	0	-	-	100	4	0	4
	Total	**20**	**8**	**1**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**21**	**04**	**25**

Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

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

Sr. No.	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
		L	P	T	End Semester Exam	Continuous Assessment			TW & PR	TW & OR		Theory	TW	Total Credits
						Unit Test	Attendance	Assignments						
21	Analog integrated circuits	3	2	0	60	20	10	10	50	-	150	3	1	4
22	Electronic Circuits and Applications	4	2	0	60	20	10	10	50	-	150	4	1	5
23	Instrumentation & Control System	3	0	1	60	20	10	10	-	-	100	4	0	4
24	Analog Communication	3	2	0	60	20	10	10	-	50	150	3	1	4
25	Data Structure & Files	3	2	0	60	20	10	10	-	50	150	3	1	4
26	Professional Skill Development-IV	4	0	0	100	-	--	-	-	-	100	4	0	4
	Total	**20**	**08**	**01**	**400**	**100**	**50**	**50**	**100**	**100**	**800**	**21**	**4**	**25**

Total Credits Sem – III : 25

Total Credits Sem – IV : 25

Grand total : 50

B.Tech.(Electronics) Sem-III

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- III

SUBJECT: - Engineering Mathematics-III

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Tutorial: 1 Hours/week	**Continuous Assessment: 40 Marks**
	Credits: 04

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**) **(06Hours)**

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 **(06Hours)**

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 **(06Hours)**

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) **(06Hours)**

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 **(06Hours)**

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 **(06Hours)**

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

Assignments:

1. Solve the problem based on Linear Differential Equations
2. Solve the problem based on Complex Variables
3. Solve the problem based on Fourier and Z -Transforms
4. Solve the problem based on Laplace Transform
5. Solve the problem based on Vector Differential Calculus
6. Solve the problem based on Vector Integral Calculus

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. 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

Class: B.Tech (Electronics) Sem:- III

SUBJECT: - Analog Electronics

Teaching Scheme:	**Examination Scheme**	
Lecture: 4 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**05**

Course prerequisites:

- Knowledge of Electronic Components
- Fundamentals of P-N diode.
- Knowledge of BJT and its configuration

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. Requirements of a biasing circuit, 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, Transistor as an amplifier.

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.

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)

Types of MOSFET viz. D-MOSFET, E-MOSFET, 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 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, Diode as a clamper, voltage multiplier circuits-voltage doubler, tripler and quadrupler configuration, Multivibrator circuits-astable and monostable multivibrator circuit using BJT.

Unit-VI

Optoelectronic 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 plot transfer characteristics of Optocoupler
7. To plot V-I and optical characteristics of LED and LDR
8. To plot V-I and optical characteristics of Photodiode and phototransistor

Assignments:

1. Simulation of BJT amplifier using Multisim.
2. Define h-parameters for CE, CB, CC configuration and describe how these parameters are determined from BJT characteristics.
3. Describe fabrication process of MOSFET and any two real time applications of MOSFETs
4. Real time applications of optoelectronics devices such as LED, Optoisolator
5. To design, built and test given electronic circuits (Group activity)
6. Obtain industry exposure based on product design industry and prepare report for the same.

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- 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:

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

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- III

SUBJECT: - Signals and Systems

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Tutorial: 1Hour/week	**Continuous Assessment:**	**40 Marks**
	TW & OR.:	**50 Marks**
	Credits:	**04**

Course prerequisites:

Before proceeding with this tutorial, you must have a basic understanding of differential and integral calculus, limits and adequate knowledge of mathematics.

Course objective:

The course aims to develop good understanding about signals, systems and their classification and analysis 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. Represent & classify signals, Systems & identify LTI systems
2. Analyze the systems 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, applications of Fourier series & Fourier transforms to the system analysis.

Unit-IV

System Analysis in Laplace Transform (06 Hours)

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

Unit-V

System Analysis in Z-Transform (06 Hours)

Z-Transform: Definition and its properties, Region of Convergence for the Z-Transform, the Inverse z-Transform, Applications 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:

Perform the following assignments using MATLAB (any three) and Virtual Lab (any three)

1. Generation of Signals
2. Linear convolution of any two signals
3. Fourier transform of given signal
4. Laplace Transform of given signal
5. Z-transform of given signal
6. Sampling Theorem & aliasing effect.

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

Assessment Methods:

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

Text Books:

1. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, "Signals and Systems" Pearson Education Asia / PHI, 2nd edition, 1997. Indian Reprint 2002
2. Simon Haykins and Barry Van Veen, Signals and Systems John Wiley & sons , Inc,2004.

Reference Books:

1. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2005
2. H. P Hsu, R. Ranjan, "Signals and Systems", Scham‟s outlines, McGraw Hill,2006
3. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, McGraw Hill International/TMH, 2007

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) SEM: - III
SUBJECT: - Digital Logic Circuits

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**04**

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, Demultiplexer, encoder, decoder and arithmetic circuits.
4. Demonstrate the knowledge of operations of basic types of flip-flops, registers, counters & the design of Finite State Machine.
5. Describe the characteristics of PLDs, Semiconductor memories and their applications.

Contents:

Unit –I

Number Systems, Codes & reduction techniques: (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.

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

Combinational Logic Modules and their Applications (6 Hours)

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

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 Modules (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, Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization.

Unit-V

Shift Registers & Counters (5 Hours)

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

PLDs & Memories (6 Hours)

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

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

List of 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. 1 & 2 bit digital comparator and ALU verification
6. Function implementation using Multiplexer and Demultiplexer
7. Sequence generator using MSJK flip flop IC's
8. Study of counters : Ripple , Synchronous , Ring , Johnson , Up-down counter and its application
9. Study of shift registers : Shift left , Shift right , parallel loading and Pulse Train generator
10. BCD Adder/Subtractor with Decoder driver and 7 segment display

Assignments:

1. Implement a multiplexer using Virtual laboratory
2. Design example based on combinational circuit
3. Design for e.g. digital clock, digital event counter,timers,and various multi-vibrator circuits, small processor ports or scrolling display
4. Implementation of combinational logic using PLAs
5. Design a pulse train generator using shift register

6. Design example based on state machine

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

3. Tocci R.J., Neal S. Widmer, *Digital Systems: Principles and Applications,* Pearson Education Asia, Second Indian Reprint 2002

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

4. Thomas L Floyd & R.P Jain, *digital Fundamentals* (Eight editions), Pearson

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) SEM: - III
SUBJECT: - Circuit Theory

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**04**

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

Fundamentals Of Network (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

Application Of 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 networks, Principle of Duality

Unit III

Transient Analysis (6 Hours)

Initial Conditions in networks. A procedure for evaluating initial conditions. Solution of step response in RC, RL, RLC circuits using classical method, Analogous equivalence of mechanical system.

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

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

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

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.

Assignments:

1. Analyze the circuit using mesh and node analysis.
2. Apply graph theory for circuit.
3. Describe any two real time applications of passive filters.
4. Simulation of series and parallel resonance circuit using Multisim.
5. Transient response of RC, RL and RLC circuit using Multisim.
6. Obtain industry exposure based on product design industry and prepare report for the same.

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

B.Tech.(Electronics) Sem-IV

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem: - IV

SUBJECT: - Analog Integrated Circuits

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**04**

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

Fundamentals of Operational Amplifier (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

Operational Amplifier – Linear circuits (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

Operational Amplifier - Non-linear circuits (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

Unit-V

Special function IC's (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

Unit-VI

Interfacing circuits (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. Find out any three ICs of op-amp other than IC 741 and compare the characteristics with IC 741.
2. List out any two linear applications of op-amp which are not specified in syllabus and explain the working along with circuit diagrams.
3. List out any two non-linear applications of op-amp which are not specified in syllabus and explain the working along with circuit diagrams.
4. Design sinusoidal generators using op-amp for a given frequency.
5. Real time applications of IC555/ IC565.
6. Obtain industry exposure based on product design and prepare report for the same.

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. Ramakant A.Gayakwad, OP-AMP and Linear ICs, Prentice Hall of India, 4th Edition, 2010.
2. K. R. Botkar, Integrated Circuits, khanna Publishers, 10th edition, 2010

References Books:

1. David A. Bell, "Operational Amplifiers and Linear ICs", Oxford publication,3rd edition,2011
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Tata McGraw Hill, 3rd edition, 2008
3. D.Roy Choudhry, Shail Jain, Linear Integrated Circuits, New Age International Pvt. Ltd., 4th edition, 2010.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Electronic Circuits and applications

Teaching Scheme:	**Examination Scheme**	
Lecture: 4 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**05**

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

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

Multistage 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

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. Study of CE two-stage amplifier with capacitive coupling
2. Study of Voltage series and current series feedback amplifiers
3. Study of Voltage shunt and current shunt feedback amplifiers
4. Study of Class B/AB push – pull/ Complementary Symmetry power amplifier.
5. Study of RC Oscillators - phase shift and wien bridge oscillators
6. Study of LC oscillators – Hartley, Colpitt oscillators
7. Study of Linear voltage regulators – series regulator using series pass transistor, shunt regulator using zener diode
8. Study of Fold back current limiting using IC 723

Assignments:

1. Analyze given feedback amplifier.
2. Describe any two real time applications of power amplifier.
3. Simulation of oscillator using Multisim.
4. Describe any two real time applications of regulator.
5. To design, built and test given electronic circuits(Group activity)
6. Obtain industry exposure based on electronic product design and prepare report for the same.

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 “by Millaman Halkies ,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 McGrawHill
6. “Basic Electronics” by Zbar, Malvino and Miller, 7 edition, Tata McGraw Hill

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Instrumentation & Control System

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Tutorial: 1Hour/week	**Continuous Assessment:**	**40 Marks**
	Credits:	**04**

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.

Contents:

Unit I

Control System **(06 Hours)**

Introduction to Control System, control problems, Feedback and Non-feedback Systems, Transfer Function, Analysis of T.F. using Block diagram and signal flow graph.

Unit II

Transducers and Controller Components **(06 Hours)**

Classification of Transducers and its Characteristics. RTD, Thermocouple, Thermister, capacitive transducer, LVDT, strain gauge and Electromagnetic flow-meter. Linear Approximation of Nonlinear Systems, synchros, dc and ac servomotors, tacho-generators, electro hydraulic valves, electro pneumatic valves.

Unit III

Time Response Analysis **(06 Hours)**

Standard Test Signals, Time Response of First order system and second order system, steady state error (e_{ss}) and error constants (Kp, Kv, Ka), performance indices.

Unit IV

Stability **(06 Hours)**

Concept of stability, necessary conditions for stability, Hurwitz and Routh stability criteria, stability of system modeled in state variable form, root locus technique.

Unit V

Frequency Response Analysis **(06 Hours)**

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

Unit VI

Controllers **(06 Hours)**

Control actions – On/Off, P, PI, PD, PID. PLC Architecture, Introduction to Ladder Diagram

List of Practicals:

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

Assignments:

1. Transfer function of closed loop system.
2. Transient response specifications of second order system.
3. Describe characteristics of temperature transducers..
4. Effect of addition of poles and zeros.
5. Describe architecture of PLC.
6. Simulation of Controller using Virtual Lab and LabVIEW.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

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

Text Books /Reference Books:

1. I. J. Nagrath & M. Gopal, "Modern Control Engineering", New Age International, New Delhi (Fifth Ediion) 2007.
2. Ogata, K., "Modern Control Engineering", Prentice Hall, second edition, 1991
3. A K Sawhney, Electrical and Electronic Measurements and Instrumentation, Dhanpt Rai and Co. Ltd.
4. H S Kalsi, Electronic Instrumentation, Tata McGraw-Hill.
5. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Analog Communication

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & OR.:	**50 Marks**
	Credits:	**04**

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 (6 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 (6 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

Radio Receivers **(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. Design of circuit for noise and noise figure analysis using Multisim.
2. Simulation of AM modulation and demodulation using MATLAB.
3. Simulation of FM modulation and demodulation using MATLAB.
4. Design and simulation of AM Receiver using MATLAB. Simulink.

5. Design of PWM modulator using Multisim.

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

Assessment Methods:

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

Text Book:-

B.P.Lathi 'Modern Digital and analog Communication System' Oxford University press.

Reference Books:-

1.George Kennedy 'Electronics Communication System'- IV th Edition-Tata McGraw Hill Publication.

2. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Data structures and Files

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & OR.:	**50 Marks**
	Credits:	**04**

Course prerequisites:

- Basic Knowledge of C language.

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 , Call by Value ,Call by Reference , Passing arrays Passing a function to function, Pointer to function ,Pointers.

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. 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, 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. AVL trees

Unit-VI

Graphs (3 hours)

Definition ,Adjacent vertices and Incident edges, graph representation, 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. State various types of data types and create a database of students in a class using structures.
2. Write a C code to create a digital clock, rainbow etc.
3. Case study on any real time application.

Example :

i. Whatsapp, Hike, Wechat, Line social communication software

ii. Cars lined up at a car wash.

iii. Customers at a grocery store check out.

iv. Airplane taking off and landing on a runway, etc

4. Comparison between various types of programming languages.
5. Write a c program to construct tower of Hanoi.
6. Write a c program to sort structures on the basis of structure elements.

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.

SUBJECT: - Rehabilitation Engineering