Rajiv Gandhi Technological University, Bhopal (MP)

B.E. (EI) Electronics and Instrumentation

Revised syllabus and Scheme of Examination effective from July 2007

THIRD SEMESTER

S. No	Course Category	Course Codes (New)	Subject	Period Per Week				Distribution of Marks				
								Theory Exam	Practical Exam	Internal Assessment		Total
				L	T	P	C			MST	TW	
1.	BS-5	BE 301	Mathematics –III	3	1	0	4	100	-	20	-	120
2.	HS 2	BM/CS/EC/EI 302	Energy Environment Ethics & Society	3	1	0	4	100	-	20	-	120
3.	DID 1	BM/CS/EI 303	Digital Circuits and Systems	3	1	2	6	100	50	20	30	200
4.	DC 1	EI 304	Measurement Science & Techniques	3	1	2	6	100	50	20	30	200
5.	DID 2	EI/EX 305	Network Analysis	3	1	2	6	100	50	20	30	200
6.	IT 2	EI 306	Java	0	0	4	4	-	50	-	50	100
7.	NECC 1	EI 307	Self Study	0	0	1	1	-	-	-	30	30
8.	NECC 2	EI 308	Seminar /Group Discussion	0	0	1	1	-	-	-	30	30
Total				15	5	12	32	500	200	100	200	1000

BS	Basic Sciences	HS	Humanity Sciences
DC	Department Core	DID	Department Inter Disciplinary
IT	Information Technology subjects	NECC	Non Exam Credit Course
MST	Mid Semester Test	TW	Term Work (Session/ Practical)
C	Credits	L	Lecture Hrs
P	Practical Hrs	T	Tutorial Hrs

Rajiv Gandhi Technological University, Bhopal (MP)

B.E. (EI) Electronics and Instrumentation

Revised syllabus and Scheme of Examination effective from July 2007

FOURTH SEMESTER

S.No	Course Category	Course Codes (New)	Subject	Period Per Week				Distribution of Marks				
								Theory Exam	Practical Exam	Internal Assessment		Total
				L	T	P	C			MST	TW	
1	DC 2	EI 401	Signals and Systems	3	1	0	4	100	-	20	-	120
2	DC 3	EI 402	Data Structures and algorithms	3	1	0	4	100	-	20	-	120
3	DID 3	EI/BM 403	Analog Electronics	3	1	2	6	100	50	20	30	200
4	DID 4	BM /EI 404	Electronic Circuits	3	1	2	6	100	50	20	30	200
5	DC 4	EI405	Mechanical Measurements	3	1	2	6	100	50	20	30	200
6	IT 3	EI 406	Software Lab -1	0	0	4	4	-	50	-	50	100
7	NEC C 3	EI 407	Self Study	0	0	1	1	-	-	-	30	30
8	NEC C 4	EI 408	Seminar / Group Discussion/Electronic Workshop etc.	0	0	1	1	-	-	-	30	30
Total				15	5	12	32	500	200	100	200	1000

BS	Basic Sciences	HS	Humanity Sciences
DC	Department Core	DID	Department Inter Disciplinary
IT	Information Technology subjects	NECC	Non Exam Credit Course
MST	Mid Semester Test	TW	Term Work (Session/ Practical)
C	Credits	L	Lecture Hrs
P	Practical Hrs	T	Tutorial Hrs

COURSE CONTENTS

Category	Title	Code	Credits-4C			Theory Papers
Basic Sciences BS-5	Mathematics-III	BE 301	L	T	P	Max Marks-100
			3	1	0	Min Marks-35
						Duration-3 Hrs

Unit 1 Functions of Complex Variables: Analytic functions, Harmonic Conjugate, Cauchy - Riemann Equations, Line integral, Cauchy's theorem, Cauchy's Integral formula, Singular points, Poles and Residues, Residue theorem, Evaluation of Real Integral, Bilinear Transformation.

Unit 2 Numerical Analysis: Difference operators, Errors and Approximations, Interpolation, Inverse interpolation, Numerical differentiation, Numerical Integration by using Simpson's method, Weddel's rule and Gauss legendre open quadrate formula.

Unit 3 Solutions of algebraic and transcendental equations(Regular False, Newton-Raphson, Iterative, Graffe's root squaring methods), Solutions of simultaneous algebraic equations, Solutions of ordinary differential equations (Tailor's Series, Picard's Method, Modified Euler's method, Runge Kutta Method, Predictor-Corrector Method), Solution of Partial differential equation.

Unit 4 Introduction to optimization by linear programming, only two variable problems solution by graphical and simplex method, concept of degeneracy and duality; simple three variable transport and assignment problems and modeling into LPP.

Unit 5 introduction to Q theory and Markovian process, time independent property of exponential distribution, solution of only M/M/1 (∞/∞/FCFS) Queues; introduction to design of experiments, factorial design, sampling methods, Taguchi Loss Function, robust design methods, variance reduction and six (±3)σ outliers in quality.

References:

1. Kreyszig E; Advanced Engineering Mathematics; Wiley Eastern Limited.
2. Ramana BV; Higher Engineering Mathematics; TMH
3. Grewal BS; Higher Engineering Mathematics; Khanna Publisher.
4. Taha H; Operations Research an Introduction; PHI
5. Ross; Taguchi techniques for Quality engineering, TMH
6. Spiegel; Theory and problems of probability and statistics; TMH
7. Chandrasekharaiah DS; Engineering Maths Part II & III; Prism Books Pvt.
8. Johnson; Miller and Freund's Probability and statistics for Engineers; PHI.
9. Jaggi, Mathur; Engineering Mathematics; Khanna Publisher.

COURSE CONTENTS

Category	Title	Code	Credits-4C			Theory Papers
Humanities and Science HS 2	Energy Environment Ethics and Society	BM/CS/EC/EE /EI/EX/IT 302	L	T	P	Max Mark-100
			3	1	0	Min Mark-35
						Duration-3Hrs

Unit 1 Energy: linkage with development, world energy scenario, fossil fuel resource- estimates and duration, India's energy scenario; Finite/ depleting energy resources, coal, oil, gas, nuclear fission, promises and present status of nuclear fusion energy; Renewable energy, solar, hydro, wind, biomass, ocean, tidal, wave and geothermal.

Unit 2 Society and environment: exponential growth in population, environmentally optimum sustainable population, pros and cons of reducing birth-rates; solar and natural capital, perpetual, renewable and exhaustible resources, free access resources and the tragedy of commons; environment problems and impact of P.A.T (Population, Affluence and Technology), environmentally beneficial and harmful technologies; interaction between environment, life support systems and socio-culture system.

Unit 3 Ecosystem: definition, concepts, structure, realm of ecology, lithosphere, hydrosphere, biosphere, atmosphere-troposphere-stratosphere; Nonrandom high quality solar energy flow to earth, greenhouse effect, matter and nutrient recycling in ecosystems; nitrogen, oxygen, carbon and water cycles, food producers, consumers and decomposers, food chains; biodiversity, threat and conservation of biodiversity.

Unit 4 Air pollution-primary, secondary; chemical and photochemical reactions, effects of CO, NO, CH and particulates, acid rain, global warming and Ozone depletion; monitoring and control of pollutants; noise pollution-sources and control measures; thermal-, heavy metals- and nuclear pollutions; industrial pollution from paper, pharmacy, distillery, tannery, fertilizer, food processing and small scale industries. Environment impact assessment policies and auditing, conflicting worldviews and environmentally sustainable economic growth, introduction to Design For Environment (DFE), product lifecycle assessment for environment and ISO 14000; triple bottom-line of economic, environment and social performance; environmental ethics, its world impact and challenges.

Unit 5 Ethics and moral values, ethical situations, objectives of ethics and its study, role morality and conflicts; values, policies and Organization Culture; Non-professional, quasi- and hard-professionals; preventive, personal, common and professional ethics; different ethical value criteria with discussion on the case of priority for improvement of urban (high traffic) or rural (low traffic) intersections causing equal number of fatalities; codes of ethics and their limitations; Institute of engineers code for corporate member and ACM professional-code.

References:

1. Miller G. T Jr; Living in the environment; Cengage Publisher.
2. Harris CE, Prichard MS, Rabins MJ, Engineering Ethics; Cengage Pub.
3. Govindrajan, Natrajan, Santikumar; Engineering Ethics; PHI pub.
4. Rana SVS;Essentials of ecology and environment; PHI Pub.
5. Bala Krishnamoorthy; Ennvironmental management; PHI.
6. Gerard Kiely, Environmental Engineering; TMH
7. Khan BH; Non Conventional energy resources; TMH Pub.
8. Raynold G.W. "Ethics in Information Technology; Cengage.

Course Contents

Category	Title	Code	Credits-6C			Theory Paper
			L	T	P	
DID 1	Digital Circuits & Systems	BM/CS/EI 303	3	1	2	Max. Marks-100 Min.Marks-35 Duration-3hrs.

Unit I Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant, Karnaugh map method, Quine & McCluskey's method, Cases with don't care terms, Multiple output switching function.

Unit II Introduction to logic gates, Universal gate, Half adder, Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition, BCD adders, Look-ahead carry generator.

Unit III Linear wave shaping circuits, Bistable, Monostable & Astable multivibrator, Schmitt trigger circuits & Schmitt-Nand gates. Logic families: RTL, DTL, All types of TTL circuits, ECL, I2L, PMOS, NMOS & CMOS logic, Gated flip-flops and gated multivibrator, Interfacing between TTL to MOS.

Unit IV Decoders, Encoders, Multiplexers, Demultiplexers, Introduction to various semiconductor memories & designing with ROM and PLA. Introduction to Shift Registers, Counters, Synchronous & asynchronous counters, Designing of Combinational circuits like code converters.

Unit V Introduction of Analog to Digital & Digital to Analog converters, sample & hold circuits and V-F converters.

References:

1. M. Mano; "Digital Logic & Computer Design"; PHI.
2. Malvino & Leach; "Digital Principles & Applications"; TMH
3. W.H. Gothman; "Digital Electronics"; (PHI).
4. Millman & Taub; "Pulse, Digital & Switching Waveforms".(McGraw Hill)
5. R.J. Tocci, "Digital Systems Principles & Applications".

List of experiment (Expandable):

All experiments (wherever applicable) should be performed through the following steps. **Step 1**: Circuit should be designed/ drafted on paper. **Step 2**: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). **Step 3**: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4**: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To study and test of operation of all logic gates for various IC's (IC#7400,IC#7403,IC# 7408,IC#74332,IC#7486).
2. Verification of Demorgan's theorem.
3. To construct of half adder and full adder
4. To construct of half subtractor and full subtractor circuits
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Designing and verification of property of full adder.
8. Design a BCD to excess-3 code converter.
9. Design a Multiplexer/ Demultiplexer.

Course Contents

Category	Title	Code	Credits-6C			Theory Papers
			L	T	P	
DC 1	Measurement Science & Techniques	EI 304	3	1	2	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Unit I Introduction to measurement: Definition, application and types of measurement System, Accuracy, Precision, sensitivity, Resolution, introduction to static and Dynamic Characteristics, Error and uncertainty analysis, Loading effect.

Unit II Electrical measurement: Construction and operation of moving coil, moving iron, hot iron instrument-Ammeter & voltmeter, Theory and Operation of D'arsonval, Ballistic and vibration Galvanometer, instrument transformers. Extension of instrument ranges.

Unit III R, L, C Measurement: Bridges: Measurement of resistance using Wheatstone bridge, Kelvin's double bridge, Loss of charge method, ohm meter, meggar Measurement of inductance and capacitance by A.C. bridges: Maxwell's bridge, Anderson bridge, Schering bridge, Hay's bridge, Wein's bridge, Shielding and grounding, Q meter.

Unit IV Digital instruments: Advantages of digital instruments, Over analog instruments, D-A, A-D conversion, Digital voltmeter, Ramp type DVM, Integrating DVM, successive approximation DVM, frequency meter. Display devices: CRO-construction and working, deflection, triggering & synchronization, Time, Phase, Frequency measurement. Storage CRO, Sampling CRO, Digital Oscilloscope. Displays (LED, LCD and seven segment etc)

Unit V Signal generator: Function generator, sweep frequency generator, Pulse and square wave generator, Wave Analysers, Harmonic Distortion Analyser, Spectrum Analyser, frequency counter.

References:

1. Modem Electronics Instrumentation, Albert D. Cooper, PHI.
2. Electrical and electronic Measurement by A.K.Sawhney
3. Measurement system by Doebelin
4. Electronic Instrumentation – Kalsi – TMH

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps. **Step 1**: Circuit should be designed/ drafted on paper. **Step 2**: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). **Step 3**: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4**: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. Experiments to enhance knowledge pertaining to this subject.

Course Contents

Category	Title	Code	Credit-6			Theory paper
DID-2	Network Analysis	BM/EC/EE /EI/EX 305	L	T	P	Max. Marks-100 Min. Marks: 35
			3	1	2	Duration: 3 hrs.

Unit I Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis :- Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis- Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.

Unit II Network Theorems for AC & DC circuits- Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit III Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

Unit IV Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.

Unit V Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function.
Two port parameters – Z,Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port network.

References:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH
7. Decarlo lin; Linear circuit Analysis; Oxford
8. William D Stanley : Network Analysis with Applications, Pearson Education
9. Roy Choudhary D; Network and systems; New Age Pub
10. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits :TMH
11. Chakraborti :Circuit theory: Dhanpat Rai
12. B.Chattopadhyay & P.C.Rakshit; Fundamental of Electrical circuit theory; S Chand
13. Nilson & Riedel, Electric circuits ;Pearson

List of experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps. **Step 1**: Circuit should be designed/ drafted on paper. **Step 2**: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). **Step 3**: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4**: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To Verify Thevenin Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. To Determine Open Circuit parameters of Two Port Network.
7. To Determine Short Circuit parameters of a Two Port Network.
8. To Determine A,B, C, D parameters of a Two Port Network
9. To Determine h parameters of a Two Port Network
10. To Find Frequency Response of RLC Series Circuit.
11. To Find Frequency Response of RLC parallel Circuit.

Course Contents

Category	Title	Code	Credits-4C			Practical
IT-2	JAVA	CS/CE/EI 306	L	T	P	Max. Marks-50
			0	0	4	Min. Marks-25
						Duration-

UNIT-I Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT–II Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees,
Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector.
Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT–III Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT–IV Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT–V Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, ”JAVA, How to Program”; PHI, Pearson.
2. E. Balaguruswamy, “Programming In Java”; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, “Peter Norton Guide To Java Programming”, Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance and Polymorphism
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a program to Hide a Class
10. Write a Program to show Data Base Connectivity Using JAVA
11. Write a Program to show “HELLO JAVA ” in Explorer using Applet
12. Write a Program to show Connectivity using JDBC
13. Write a program to demonstrate multithreading using Java.
14. Write a program to demonstrate applet life cycle.

COURSE CONTENT

Category	Title	Code	Credits-4C			Theory Paper
DC 2	Signals and Systems	EI 401	L	T	P	Max. Marks-100
			3	1	0	Min.Marks-35 Duration-3hrs.

UNIT I Representation of signals and systems : Signals and classification of signals, basic continuous-time signals, basic discrete time signals, sampling theorem, systems and classification of systems, response of a continuous-time LTI system and the convolution integral, properties of continuous-time LTI systems, Eigen functions of continuous-time LTI systems, systems described by differential equations, response of a discrete-time LTI system and convolution sum, properties of discrete-time LTI systems, Eigen functions of discrete-time LTI systems, Transmission of signals through a LTI system.

UNIT II Fourier Analysis of continuous-time signals and systems :Introduction, Fourier series representation of periodic signals, the Fourier Transform, properties of the continuous-time Fourier Transform, the frequency response of continuous-time LTI systems, filtering, bandwidth.

UNIT III Fourier analysis of discrete-time signals and systems :Introduction, Discrete Fourier Series, the Fourier Transform, properties of the Fourier Transform, the frequency response of discrete-time LTI systems, system response to Sampled continuous-time sinusoids, the Discrete Fourier Transform.

UNIT IV The Z-Transform :Introduction, the Z-Transform, Relation between Z-Transform and Fourier Transform-Transforms of some common sequences, properties of the Z-Transform, the inverse Z-Transform, the system function of discrete-time LTI systems, the unilateral Z-Transform .

UNIT V Discrete Time Random Processes: Random variables –Definitions, ensemble averages, jointly distributed random variables, joint moments, independent, uncorrelated and orthogonal random variables, Gaussian random variables. Random Processes – Ensemble averages, stationary processes, the auto covariance and autocorrelation matrices, ergodicity, white noise, frequency domain description of random processes, transmission of random signals through a LTI system.

References:

1. Oppenheim AV, Willisky AS and Nawab SH; Signals and systems; Pearson.
2. Proakis JP,.Manolakis; Digital Signal Processing principles…; Pearson.
3. Hwei.P .Hsu; Signals and systems, Schaum`s outlines; TMH.

COURSE CONTENT

Category	Title	Code	Credits-4C			Theory Paper
DC 3	Data structure and algorithms	EI 402	L	T	P	Max. Marks-100
			3	1	0	Min.Marks-35 Duration-3hrs.

Unit I Structural programming, top-down design., abstract data type, implementation of arrays, triangular arrays, structures, character strings, Pointers dynamic memory management.

Unit II Singly linked list, implementation linked list using arrays, implementation of linked list using dynamic memory allocation circular link list, Josphus problem, doubly linked list, polynomial manipulation using linked list, representation of sparse matrices. Stacks - their concepts and implementation, multiple stacks. Conversion of infix to postfix notation using stack, evaluation of postfix expression, recursion, how recursion- works, queues their concepts and implementation, Queue, primary queues, simulation.

Unit III Trees, Binary tree - their representation and operations, tree traversals, threaded binary trees, conversion of general trees to binary trees, binary expression tree, applications of trees. sequential searching, binary search, height balanced tree and weight balanced trees, multiway search trees, digital search, trees, hashing and collision - resolution techniques.

Unit IV Various sorting algorithms viz. bubble sort, selection sort, inserted sort, Quicksort, merge sort, address calculation sort and heap sort, complexity of the algorithm.

Unit V Graphs, terminology, representation of graphs, reachability, minimum path problem, critical events, Graph traversals, spanning trees, application of graph.

References:

1. Data structures using C: By Tannenbaum
2. Data structures: By Trembley Sorenson
3. Data structures using C: By Rajiv Jindal

COURSE CONTENTS

Category	Title	Code	Credits-6C			Theory Papers
DID 3	Analog Electronics	EI/BM 403	L	T	P	Max Mark-100
			3	1	2	Min Mark-35
						Duration-3Hrs

Unit I Bipolar Junction Transistor: Concept of load line, Biasing and bias stability, transistor at low and high frequencies, Transistor modeling – transistor hybrid model, the h parameters, the hybrid pi- model, gain bandwidth product.

Unit II JFET: Construction, Operation and Biasing of JFET, and MOSFET device, The FET small signal model, V-I characteristics, biasing and load line equivalent circuits of the device, analysis of FET amplifiers.

Unit III Multistage or Cascade amplifier: classification of multi-stage amplifier, coupling and frequency response of cascaded systems, effect of cascading on voltage gain, current gain, phase, input and output impedances and bandwidth of cascaded or multistage amplifiers, types of coupling, cascade and cascade circuits, tiller theorem, Darlington pair, bootstrap circuit.

Unit IV Tuned amplifier: single tuned, double tuned and stagger tuned amplifiers characteristics and their frequency response.

Unit V Power amplifier: Class A, B, AB, push pull and Class C power amplifiers, Comparisons of their efficiencies, types of distortion.

References:

1. Integrated Electronics. - Millman Halkias TMH
2. Electronic Devices & circuits – Boyelstad & Neshelsky – PHI
3. Electronic Devices & Circuits – David A.Bell – PHI
4. Principles of Electronic Devices – Malvino
5. Electronics Devices and circuits – Salivahanan Vallavraj, TMH

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps. **Step 1**: Circuit should be designed/ drafted on paper. **Step 2**: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). **Step 3**: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4**: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To plot common base configuration input/output characteristic of PNP bipolar junction transistor.
2. To plot common emitter configuration input/output characteristic of NPN bipolar junction transistor.
3. To plot common Collector base configuration input/output characteristic of PNP bipolar junction transistor.
4. To draw the characteristics of FET.
5. To draw the frequency response characteristics of various types of amplifiers e.g. tuned and power amplifiers.

Course Contents

Category	Title	Code	Credit-6			Theory paper
DID 4	Electronic Circuits	BM/EI 404	L	T	P	Max. Marks-100
			3	1	2	Min. Marks: 35
						Duration: 3 hrs.

Unit I Feedback Amplifiers: Concept of feedback, positive and negative feedback, voltage and current feedback, series and shunt feedback, effect of feedback on performance characteristics of an amplifier, stability criterion.

Unit II Oscillators: Condition for sustained oscillation, R-C phase shift, Hartley, Colpitts, Crystal and wein bridge oscillators, Negative resistance Oscillator.

Unit III Transistor Circuit Techniques and amplifiers: Linear integrated circuits introduction, Differential amplifiers, configuration, Analysis using h parameters, Differential gain, common mode gain CMRR. Constant current sources, current mirrors, level shifting circuits, cascaded amplifier stages, direct coupled amplifiers, problem of drift, chopper amplifiers

Unit – IV Operational Amplifiers Specifications, imperfections in operational amplifiers. Slew Rate and its effect on full power bandwith, Input Offset voltage, Bias and offset currents, compensation, frequency response effects, Lag Compensation, application of OP.AMP Inverting and non inverting mode, differential mode, instrumentation amplifiers, comparator, Schmitt trigger, precision rectifiers, logarithmic amplifiers, Analogue computation, Summer, Average integrators, differentiators, scaling multipliers.

Unit-V Active Filters: Filter specifications, introduction to butter worth chebyshev, inverse chebyshev approximations and their comparison, first and second order low pass high pass, band pass and band stop filters, switched capacitor filters, 555 timer and its applications V/F and F/V converters, pulse generators, voltage to current to voltage converters.

References:

1. Tobbey et al: OP-Amps their design and applications
2. R.A. Gayakwad: OP-Amps and Linear Integrated circuit, PHI
3. D.Raychowdhary and Shaul Jain: Linear Integrated Circuits
4. Millman & Halkias: Itegrated Electronics

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps. Step 1: Circuit should be designed/ drafted on paper. Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. Char. Of Op-Amp (input offset voltage, slew rate, CMRR, BW, input bias current.
2. Linear application of Op-Amp (voltage follower, inverting and non-inverting amplifier and their frequency response, adder, subtractor, differential amplifier, integrator and differential frequency response)
3. Design and performance evaluation of feedback amplifiers.
4. Design and performance evaluation of oscillators.
5. Design and performance evaluation of various filters.

Course Contents

Category	Title	Code	Credits-06			Theory Papers
DC 4	Mechanical Measurements	EI 405	L	T	P	Max.Marks-100
			3	1	2	Min.Marks-35 Duration-3hrs.

Unit I Motion and Vibration Measurement: Translational and rotational displacement using potentiometers, Strain Gauges, Differential transformer, Synchros and induction potentiometer, Capacitance, Digital displacement transducers, Photo elastic, Moire fringe, Holographic technique, Different types of tachometers, Accelerometer, Gyroscope.

Unit II Force, Torque and Shaft Power Measurement: Elastic, Vibrating wire, Gyroscopic force transducers, Torque measurement in rotating shafts, gyroscopic torque measurement, Shaft power measurement (Dynamometers)

Unit III Pressure and sound measurement: Moderate pressure-Bourdon tube, Bellows & diaphragms, High pressure measurement-Piezo electric, Electric resistance, Low pressure measurement-Mcleod gauge, Knudsen gauge, Viscosity gauge, Thermal conductivity, Ionization gauge, Dead weight gauge, sound level measurement using different types of microphones.

Unit IV Flow measurement: Obstruction meter: Orifice, Nozzle, venturi, Pitot tube, Annubar tubes, Target, rotameter, Turbine, Electromagnetic, Vortex, Positive displacement, Anemometers, Weirs & flumes, Laser Doppler, Anemometer, Ultrasonic flow meter, fluidic oscillator, Mass flow meter, Flow visualization, Level measurement: Visual level indicators, Ordinary float type, Purge method, Buoyancy method, resistance, Capacitance and inductive Probes, Ultrasonic, Laser, Optical fiber. Thermal, Radar radiation.

Unit V Temperature measurement: Bimetallic thermometers, Liquid in glass, Pressure thermometer, thermocouples, RTD, Thermistors, Semiconductor sensors, Digital thermometers, Pyrometers, Miscellaneous Measurement: Humidity, Dew point, Viscosity, Thermal and nuclear radiation measurements.

References:

1. H.N. Norton “Handbook of transducers”
2. E.O. Doebelin “Measurement systems applications and design”
3. DVS Murthy “Transducers and instrumentation”
4. Nakra and Chaudhry “Instrumentation measurement and analysis

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps. **Step 1**: Circuit should be designed/ drafted on paper. **Step 2**: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). **Step 3**: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4**: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. Calibration of strain gauges
2. Calibration of LVDT
3. Pressure measurement Instruments
4. Flow measurement instruments
5. Temperature measurement instruments.

Course Contents

Category	Title	Code	Credit-4			Practical
IT-3	Software lab -1	EI/BM 406	L	T	P	Max. Marks-50 Min. Marks: 25
			-	-	4	

SECTION-A MATLAB

Introduction to MATLAB, Study of MATLAB programming environment, Modeling, Design and development of Programs.
Programs Related to Analog Electronics, Electronic circuits and other topics covered in the syllabus.

SECTION-B CIRCUIT SIMULATION/ PCB DESIGNING SOFTWARES

Study of Circuit Simulation Software (any one - TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER). PCB Layout Software (any one - PROTEL/ ORCADE/ ALTERA).
Design and Simulation of basic Electronic Circuits (Example Rectifiers, Amplifiers, Oscillators, Digital Circuits, Transient and steady state analysis of RC/RL/RLC circuits etc). Design and fabrication of PCB pertaining to various circuits studied on PCB machine.

References:

1. Chapman Stephen J.: MATLAB Programming for Engineers, 3rd Edition, Thomson /Cengage.
2. Rudra Pratap: Getting Started with MATLAB 7, Oxford University Press (Indian Edition).
3. Palm; Matlab 7.4; TMH.
4. Simulation/Designing Software Manuals.

List of Experiments/ Programs:
Programs to be performed based on the topics contained in the syllabus.