SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System
Course Name -BE
Scheme of Examination w.e.f. 2016-17
Semester/Year : III/IInd YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	MA112	MATHEMATICS-III	60	30	10	-	-	-	3	1	-	4	100
2	EI 302	DATA STRUCTURES AND ALGORITHMS	60	30	10	-	-	-	3	1	-	4	100
3	EI 303	DIGITAL CIRCUITS AND SYSTEMS	60	30	10	20	20	10	3	1	2	5	150
4	EI 304	MEASUREMENT SCIENCE AND TECHNIQUES	60	30	10	20	20	10	3	1	2	5	150
5	EI 305	NETWORK ANAYLSIS	60	30	10	20	20	10	3	1	2	5	150
6	EI 306	JAVA(COMPUTER LANGUAGE)	-	-	-	50	50	50	0	0	2	1	150
7	EI 307	SELF STUDY(CRITICAL THINKING)	-	-	-	-	50	50	0	0	2	1	100
8	EI 308	SEMINAR /GROUP DISCUSSION	-	-	-	-	50	50	0	0	2	1	100
TOTAL			300	150	50	110	210	180	15	5	12	26	1000

L: Lecture **T:Tutorial** **P:Practical**

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System
Course Name -BE
Scheme of Examination w.e.f. 2016-17
Semester/Year : IV/IInd YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	EI 401	SIGNALS AND SYSTEMS	60	30	10	-	-	-	3	1	-	4	100
2	EI 402	CONTROL SYSTEM	60	30	10	-	-	-	3	1	-	4	100
3	EI 403	ELECTRONICS DEVICES	60	30	10	20	20	10	3	1	2	5	150
4	EI 404	LINEAR INTEGRATED CIRCUITS AND ITS APPLICATIONS	60	30	10	20	20	10	3	1	2	5	150
5	EI 405	MECHANICAL MEASUREMENTS	60	30	10	20	20	10	3	1	2	5	150
6	EI 406	ELECTRONIC WORKSHOP LAB	-	-	-	50	50	50	0	0	2	1	150
7	EI 407	SELF STUDY(MENTAL ABILITY)	-	-	-	-	50	50	0	0	2	1	100
8	EI 408	SEMINAR /GROUP DISCUSSION	-	-	-	-	50	50	0	0	2	1	100
TOTAL			300	150	50	110	210	180	15	5	12	26	1000

L: Lecture **T:Tutorial** **P:Practical**

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System
Course Name -BE
Scheme of Examination w.e.f. 2016-17
Semester/Year : V/IIIrd YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	EI 501	MICROPROCESSOR AND MICROCONTROLLER	60	30	10	20	20	10	3	1	2	5	150
2	EI 502	OPERATING SYSTEM	60	30	10	-	-	-	3	1	-	4	100
3	EI 503	COMMUNICATION ENGINEERING	60	30	10	-	-	-	3	1	-	4	100
4	EI 504	POWER ELECTRONICS	60	30	10	20	20	10	3	1	2	5	150
5	EI 505	ANALYTICAL AND INDUSTRIAL INSTRUMENTATION	60	30	10	20	20	10	3	1	2	5	150
6	EI 506	MATLAB LAB	-	-	-	50	50	50	0	0	2	1	150
7	EI 507	INDUSTRIAL TRAINING	-	-	-	-	50	50	0	0	2	1	100
8	EI 508	SEMINAR /GROUP DISCUSSION	-	-	-	-	50	50	0	0	2	1	100
TOTAL			300	150	50	110	210	180	15	5	12	26	1000

L: Lecture **T:Tutorial** **P:Practical**

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System
Course Name -BE
Scheme of Examination w.e.f. 2016-17
Semester/Year : VI/IIIrd YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	EI 601	VLSI CIRCUITS AND SYSTEMS	60	30	10	-	-	-	3	1	-	4	100
2	EI 602	OPTICAL INSTRUMENTS AND SENSORS	60	30	10	20	20	10	3	1	2	5	150
3	EI 603	DIGITAL SIGNAL PROCESSING	60	30	10	20	20	10	3	1	2	5	150
4	EI 604	MEDICAL INSTRUMENTATION	60	30	10	20	20	10	3	1	2	5	150
5	EI 605	MANAGEMENT INFORMATION SYSTEM	60	30	10	-	-	-	3	1	-	4	100
6	EI 606	MINOR PROJECT	-	-	-	50	50	50	0	0	2	1	150
7	EI 607	EITHICS & VALUES	-	-	-	-	50	50	0	0	2	1	100
8	EI 608	SEMINAR / GROUP DISCUSSION	-	-	-	-	50	50	0	0	2	1	100
TOTAL			300	150	50	110	210	180	15	5	12	26	1000

L: Lecture **T:Tutorial** **P:Practical**

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System
Course Name -BE
Scheme of Examination w.e.f. 2016-17
Semester/Year : VII/IVth YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	EI 701	DIGITAL CONTROL SYSTEM	60	30	10	20	20	10	3	1	2	5	150
2	EI 702	PROCESS CONTROL INSTRUMENTATION	60	30	10	20	20	10	3	1	2	5	150
3	EI 703	ELECTIVE -I	60	30	10	-	-	-	3	1	-	4	100
4	EI 704	ELECTIVE -II	60	30	10	-	-	-	3	1	-	4	100
5	EI 705	ELECTIVE -III	60	30	10	-	-	-	3	1	-	4	100
6	EI 706	MAJOR PROJECT (PLANNING & LITERATURE)	-	-	-	100	50	-	0	0	4	2	150
7	EI 707	SELF STUDY	-	-	-	50	50	50	0	0	2	1	150
8	EI 708	SEMINAR / GROUP DISCUSSION	-	-	-	-	50	50	0	0	2	1	100
TOTAL			300	150	50	190	190	120	15	5	12	26	1000

L: Lecture **T:Tutorial** **P:Practical**

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System
Course Name -BE
Scheme of Examination w.e.f. 2016-17
Semester/Year : VIII/IVth YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	EI 801	MAJOR PROJECT	-	-	-	300	150	150	-	-	28	14	600
2	EI 802	COMPREHENSIVE VIVA	-	-	-	100	50	50	-	-	12	6	200
3	EI 803	SELF STUDY / GROUP DISCUSSION/SEMINAR	-	-	-	100	50	50	-	-	12	6	200
TOTAL						**500**	**250**	**250**			**52**	**26**	**1000**

L: Lecture **T:Tutorial** **P:Practical**

MA 112 - Mathematics III

Unit I

Functions of complex variables: Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for evaluation of real integrals

Unit II

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regular Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

Unit III

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit IV

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit V

Concept of Probability: Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution, Gamma Distribution, Beta Distribution, Testing of Hypothesis I: Students t-test, Fisher's z-test, Chi-Square Method

Reference:

1. Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
2. Numerical Methods for Scientific and Engg. Computation by M K Jain, Iyengar and RK Jain, New Age International Publication
3. Mathematical Methods by KV Suryanarayan Rao, SCITECH Publication
4. Numerical Methods using Matlab by Yang,Wiley India
5. Probability and Statistics by Ravichandran ,Wiley India
6. Mathematical Statistics by George R., Springer

EI- 302 Data Structures and Algorithms

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, Quick sort, 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

EI - 303 Digital Circuits and Systems

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.

EI - 304 Measurement Science & Techniques

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 Analyzers, Harmonic Distortion Analyzer, Spectrum Analyzer, 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.

Experiments to enhance knowledge pertaining to this subject.

EI - 305 Network Analysis

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.

EC - 306 Java (Computer Language)

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

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.

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, My SQL, Oracle

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

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

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.

EI -307 Self Study (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

EI -308 Seminar / Group Discussion (Internal Assessment)

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.

EI- 401 Signals and Systems

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.

EI- 402 – Control systems

Unit I

Introduction to the Control Problem

Basic Control System Terminology viz. open loop & close loop system, Servomechanism, Feed forward & Feedback control, Digital Control, Multivariable Control System, Non-Linear Control System.

Modelling Techniques for Physical System

Differential Modelling of Physical Systems, Linear Approximations of Physical Systems, The Laplace Transform, The transfer function of linear system, Block Diagram algebra, Signal Flow graphs.

Control System Components & Their Mathematical Modeling

S.C. Servomotors, A.C. Servomotors, Pneumatic devices for control, Hydraulic Devices for control, Synchronous, A/D Converters.

Unit II

Feedback Control System Characteristics

Sensitivity of control systems to parameter variation, Control over the dynamics of the system, Disturbance signals in a feedback control system, Steady-state Error.

Time Response Studies

Difference of time response, Test input signals, model of prototype D.C. position control system, Time response of prototype second order system, Performance specifications of the prototype 2nd order system, Effects of additions of poles and zeros to open loop & close loop transfer functions, time response of higher order s, stems & concept of dominant pole, Steady-state error constants for type 0,1 & @ systems, Need for compensation for the prototype 2nd order system.

Unit III

Time Domain Stability Analysis

Concept of stability of linear systems, bounded input bounded output / zero-input stability, The routh stability criteria, Stability range for a parameter, Co-relation between the closed loop poles & stability, The Root-locus concept, Guidelines for sketching Root-locus, Elementary idea of reshaping the Root-locus, Root-locus of systems with Dead time, Root sensitivity.

Frequency Domain Analysis of Control System

Performance specification in frequency domain, Co-relation between frequency domain & time domain, Polar plots, Bode plots, Nicholas Charts, Determination of system transfer function from experimental data. Stability Analysis in Frequency Domain Development of Nyquist Criteria stability margins, Relative stability using Nyquist and Bode plots, Systems with deadtime. Design of feedback control systems Approaches to system design, Cascade compensation networks, Design of Compensators in Time & Frequency domain, Examples of proportional, PD & PID mode of control.

Unit IV

State Variable Techniques

State variable representation for an LTI system, Different Counouical forms, Co- relation between state models & Transfer function, Solution Of State Equations, Concepts of controllability & observability.

Unit V

Introduction to Software Packages Used in Control System

MATLAB, SIMULINK

REFERENCES:

1. Automatic Control System - B.C. Kuo (PHI)
2. Control System Engineering - Nagrath & Gopal (Newage Publishers)
3. Control Systems (Principles & Design) - M.Gopal (TataMcGraw Hill)
4. Modem Control System - Bishop & Dorf (Addison Welseley)
5. Automatic Control System – Kuo PHI

EI – 403 Electronics Devices

UNIT I

Semiconductor intrinsic and extrinsic, p-type and n-type, energy band diagrams, majority and minority carrier, charge density in semiconductor, generation and recombination of charges, process of diffusion, diffusion and drift currents, Hall effects and its applications. p-n junction, depletion layer, potential barrier, electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-I characteristics, cut in voltages of Si and Ge diode, transition and diffusion capacitance, power dissipation.

UNIT II

Diode Family and Applications: Diodes Family: Characteristics and application of p-n junction diode, Zener diode, avalanche diode, Varactor diode, Schottky diode, Tunnel Diode, PIN diode, LED, photodiodes, phototransistors, p-n junction. **Applications:** diode as rectifier, clipper and clamper, The diode as a circuit element, The Load line concept, The Pieceswise linear diode modal, Clipping circuits, Clipping at two independent levels, Comparators, Sampling Gate, Rectifiers, Other full wave circuits, Capacitor filter additional diodes circuits.

UNIT III

Bipolar junction transistor - Construction, basic operation, current components and equations, CB, CE and CC-configuration, input and output characteristics, Early effect, region of operation, active, cutoff and saturation region Ebers-Moll model, , power dissipation in transistor (Pdmax rating), Photo transistor, Uni-junction Transistor (UJT) : Principle of operation, characteristics.

UNIT IV

Amplifier Basics, Transistor as an amplifier, load line, Q-point and its selection criteria, designing of fixed bias and self-bias, stability of biasing circuits, calculation of stability factor.
Transistor at low frequency: frequency response, bandwidth, h-parameter analysis of CC, CB and CE configuration, simplified model, gain and impedance calculation of single stage amplifier. **Transistor at high frequency**, high frequency model (hybrid-π), Parameters and their definition, Miller capacitance and its effect on voltage gain.

UNIT V

FET construction- Construction, n channel and p channel, characteristics, parameters, Equivalent model and voltage gain, Enhancement and depletion MOSFET and its Characteristics, analysis of FET in various configuration.

References:

1. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education
2. Millman and Halkias: Integrated electronics, TMH
3. Graham Bell: Electronic Devices and Circuits, PHI
4. Sendra and Smith: Microelectronics, Oxford Press.
5. Donald A Neamen: Electronic Circuits Analysis and Design, 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 Software

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 by one batch using PCB machine.

1. V-I characteristics of various Diodes (P-N, Zener, Varactor, Schottky, Tunnel, Photodiode etc)
2. Characteristics of Transistors (BJT and FET)
3. Study of Power electronic devices (Diac, Triac, SCR, Power MOSFET, IGBT

EI - 404 Linear Integrated Circuits and its Application

UNIT-I

Introduction to Operational Amplifiers and Characteristics

Introduction, Block diagram, characteristics and equivalent circuits of an ideal op-amp, various types of Operational Amplifiers and their applications, Power supply configurations for OP-AMP applications, inverting and non-inverting amplifier configurations.

UNIT-II

The Practical op-amp Introduction, Input offset voltage, offset current, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect,PSRR and gain –bandwidth product, frequency limitations and compensations, transient response, interpretation of TL082 datasheet.

UNIT-III

Amplifiers and Oscillators Summing amplifier, Integrators and differentiators, Instrumentation amplifier, Differential input and differential output amplifier, Voltage-series feedback amplifier, Voltage-shunt feedback amplifier, Log/ Antilog amplifier, isolation amplifiers, triangular/rectangular wave generator, phase-shift oscillators, Wein bridge oscillator, analog multiplier-MPY634, VCO.

UNIT-IV

Active Filters

Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter aracteristics, Band reject filters, notch filter, All pass filters, self-tuned filters.

UNIT-V

Comparators and Converters:

Comparator, Zero Crossing Detector, Monostable and Astable Multivibrator ,Schmitt Trigger, Voltage limiters, Clipper and clampers, Absolute value output circuit, Peak detector, Sample and hold Circuit, Precision rectifiers, Voltage-to-current converter, Current-to-voltage converter.

Advanced applications

Applications as Frequency Divider, PLL, AGC,AVC using op-AMP and analog multipliers, Amplitude modulation using analog multiplier, Frequency Shift Keying, simple OP-AMP Voltage regulator, Fixed and Adjustable Voltage Regulators, Dual Power supply, Basic Switching Regulator and characteristics of standard regulator ICs – TPS40200,TPS40210.

REFERENCES:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICS", PHI, 4th edition, 1987.
2. R.F. Coughlin & Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits" , 6th Edition, PHI
3. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.
4. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits" McGraw Hill, 1988.
5. C.G. Clayton, "Operational Amplifiers" , Butterworth & Company Publ. Ltd./ Elsevier, 1971.

List of Experiments:-

Tools Required –Function Generator, TL082, MPY634/ASLK Pro, Power Supply, Oscilloscopes, Connecting wires.

1. Study the characteristics of negative feedback amplifier
2. Design of an instrumentation amplifier.
3. Study the characteristics of regenerative feedback system with extension to design an astable multivibrator.
4. Study the characteristics of integrator circuit.
5. Design of Analog filters – I.
6. Design of Analog filters – II.
7. Design of a self-tuned Filter
8. Design of a function generator.
9. Design of a Voltage Controlled Oscillator.
10. Design of a Phase Locked Loop (PLL).
11. Automatic Gain Control (AGC) Automatic Volume Control (AVC).
12. Design of a low drop out regulator.
13. DC-DC Converter.

EI - 405 Mechanical Measurement

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.

EI - 406 Electronics Workshop Lab

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

EI- 501 - Microprocessors & Microcontrollers

UNIT 1:

Microprocessor 8086

Introduction to 16-bit 8086 microprocessors, architecture of 8086, Pin Configuration, interrupts, minimum mode and maximum mode, timing diagram, Memory interfacing, Comparative study of Salient features of 8086, 80286 and 80386.

UNIT 2:

Microprocessor 8086 programming

Instruction set of 8086, Addressing mode, Assembler directives & operations, assembly and machine language programming, subroutine call and returns, Concept of stack, Stack structure of 8086, timings and delays,

UNIT 3:

Input-Output interfacing: Memory Mapped I/O and Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251, 8 bit ADC/DAC interfacing and programming.

UNIT 4:

Microcontroller 8051:- Intel family of 8 bit microcontrollers, Architecture of 8051, Pin description, I/O configuration, interrupts; Interrupt structure and interrupt priorities, Port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing mode, instruction set of 8051 and programming.

UNIT 5:

8051 Interfacing, Applications and serial communication

8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based data acquisition system 8051 connections to RS-232, 8051 Serial communication, Serial communication modes, Serial communication programming, Serial port programming in C.

REFERENCES:

1. Hall Douglas V., Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill.
2. A.K. Ray & K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw – Hill, 2009 TMH reprint..
3. Kenneth J. Ayala**,** The 8086 microprocessor: programming and interfacing the PC, Indian - edition, CENGAGE Learning.
4. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
5. Kenneth J. Ayala**,** The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
6. V.Udayashankara and M.S.Mallik Arjunaswamy, 8051 Microcontroller: Hardware, Software & Applications, Tata McGraw – Hill, 2009.

7. McKinlay, The 8051 Microcontroller and Embedded Systems – using assembly and C, PHI, 2006 / Pearson, 2006.

List of Experiments:

1. Assembly Language Programs of Microprocessor 8085 and 8086.
2. Assembly Language Programs of Microcontroller 8051.
3. Assembly Language Programs for Interfacing Chips.

EI- 502 Operating System

Unit - I

Introduction to Operating Systems, Operating system services, multiprogramming, time sharing system, storage structures, system calls, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/0 devices organization, I/0 devices organization, I/0 devices organization, I/0 buffering.

Unit - II

Process concept, process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

Unit - III

Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, paging combined with segmentation.

Unit - IV

Concepts of virtual memory, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation. Security threads protection intruders-Viruses-trusted system.

Unit - V

Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study.

Suggested Instructions

Class room lectures. Seminar on various operating systems with special reference to their CPU scheduling, memory management, 1/0 management and file systems. Minor project.

REFERENCES:

1. Operating System by Silberschatz
2. Operating System by Deitel
3. Modern operating system by Tanneubaum

EI- 503 – Communication Engineering

Unit-1

Fourier series, Fourier Transform and its properties, Probability, random variables & their moments, their significance, convolution, auto correlation, cross Correlation & power spectral density, Gaussian & Rayleigh probability density Function, mean, variance & standard deviation, central limit theorem, voltage & Power decibel scales. Signal Processing: Types of signal, deterministic & random, periodic & non Periodic, analog & discrete, energy & power signals, Representation of sinusoid in different forms & their conversion

Unit-2

Need of modulation in a communication system, block schematic of a typical Communication system. AM modulation system, modulation index, generation & detection of AM wave, side bands & power content in an AM wave, DSB-SC, SSB, their methods of generation & detection, vestigial side Band modulation, AM transmitter block diagram, comparison of various AM system, modulation & demodulation circuits. Relationship between phase & freq. modulation, FM wave & its spectrum, phasor diagram of a narrow band FM signal, wide band FM, methods of generation & detection of FM, discriminators, pre-emphasis & de-emphasis, Stereophonic FM broadcasting, FM transmitters.

Unit-3

TRF receiver & its limitations, necessity of heterodyning, super heterodyning Receivers, IF amplifiers, selection of intermediate frequency. RF amplifiers, detectors, AGC, AVC, FM receivers, AFC.

Unit-4

Nyquist sampling theorem, TDM, pulse modulations & PCM, quantization error, necessity of non linear quantizer, A-law, μ-law, FSK & PSK, QPSK, QAM. Source of noise, noise figure, noise bandwidth, effective noise temperature, performance of AM, FM & digital system in presence of noise.

Unit-5

Satellite system block diagram, satellite freq. bands, satellite multiple access Format like TDMA, FDMA, transponders, earth station & satellite eclipses, Link calculation

REFERENCES:

1. Taub & shilling, Communication System, TMH
2. Singh & Sapre, Communication System, TMH
3. B.P. Lathi, Modern Digital and analog communication system,
4. Simon Haykins, Communication System. John Willy
5. Wayne Tomasi, Electronic Communication system.
6. Schaum outline Series, Analog and digital communication
7. Martin S. Roden, Analog & Digital Communication System, Discovery Press.
8. Frank R. Dungan, Electronic Communication System, Thomson/Vikas
9. John G. Prokis,Masoud Salehi, Gerhard Bauch, Contemporary communication systems using MATLAB, Cengage learning 2004.

EI- 504 – Power Electronics

Unit I

Power, Semiconductor Devices

Classification of Power semiconductor devices, characteristics, construction, application and theory of operation of power diode, power transistor, Thyristors. Device specifications and ratings, working of Diac, Triac, IGBT, GTO and other power semiconductor devices. Turn-on / Turn-off methods and their circuits.

Unit II Rectifiers

Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, Full wave configurations, multiphase rectification system, use of flywheel diode in controlled rectifier configurations.

Unit III

Inverters and Choppers

Classification of inverters, Transistor inverters, Thyristor inverters, Voltage and Current Communicated inverters, PWM inverters, Principle of Chopper, Chopper classification and types of regulators.

Unit IV

***A. C.* Voltage Controllers and Cyclo-converters**

Classification and operation of AC voltage and Cyclo-converters, their circuit analysis for different type of load.

Unit V

Industrial Applications

Solid-state switching circuits, Relays, Electronic Timer, battery charger, Sawtooth generator, applications in Industrial process control, Motor drive applications, Electronic regulators, etc., Induction heating, Dielectric Heating, Resistance welding and welding cycle.

Suggested List of Strategies

1.Input cum discussion of unit wise
2.Lab work
3.Self study

List of Experiments

1. To draw the V-1 characteristics of Thyristor.
2. To draw the V-1 characteristics of Triac.
3. To draw the V-1 characteristics of Diac.
4. Study of light dimmer using Triac and Diac, find out the firing angle and draw the wave forms across load and Triac.
5. Study the operation of an SCR automatic speed control circuit and see the waveforms on CRO
6. To draw the V-1 characteristics of IGBT.

REFERENCES:

1. Power electronics, converters, applications & design - Need Mohan
2. Power Electronics Circuits, devices & applications - M.H. Rashid
3. Power Electronics -P.C.Sen
4. An introduction Thyristors & their applications - M. Rammurthy
5. Power Electronics & its applications, Alok Jain, Penram Publication

EI- 505 Analytical & Industrial Instrumentation

Unit I

Difference between analytical and other instruments. Gas Analysis: Gas chromatography, Thermal conductivity method, Heat of reaction method. Estimation of oxygen, hydrogen, methane, carbon dioxide, CO, etc. in binary or complex gas mixtures. Zirconia-probe oxygen analyser. Paramagnetic oxygen meters, Electrochemical reaction method.

Unit II

Ultraviolet and visible spectrophotometry : Radiation sources, detectors, read outmodules, filters, monochromators. Instruments for absorption photometry. Fundamental laws of photometry. Infrared Spectrophotometry : Basic components of IR spectrophotometers, sample handling, Types of spectrophotometers, Fourier transform infrared spectroscopy.

Unit III

Mass spectrometry: Basic mass spectrometer, components of mass spectrometers, types of mass spectrometers resolution and applications. X-Ray methods. Production of X-Rays & X-Ray spectra, Instrumental units, detectors for the measurement of radiation, direct X-Ray methods, X-Ray absorption methods, X-Ray fluorescence methods, X-Ray diffraction, Applications Spectroscopy, ESR Spectroscopy.

Unit IV

Chemical composition Analysis : Measurement of Viscosity, turbidity, metes consistency, pH and redox potential, electrical conductivity. Techniques of density measurement Solids, liquids and gases.

Unit V

Environmental Pollution Monitoring Instruments : Air pollution monitoring instruments carbon monoxide, sulphur dioxide, Nitrogen oxides, Hydrocarbons, Ozone, Automated wet chemical air analysis. Water pollution monitoring instruments.

Suggested Instructional Strategies

1.Input cum discussions
2.Lab Work
3.Demonstration
4.Self study
5.Seminar/presentation
6.Mini project

List of Experiments

1. Study of Gas chromatograph

2. Study of X-Ray Spectrometer
3. Study of Ultraviolet & Visible Spectrophotometer
4. Study of Mass spectrometer
5. Viscosity measurement
6. Turbidity measurement

REFERENCES:

1. Patranabis D-Principles of Industrial Inst. TMH Publication
2. Merritt W H W, Dean LL and Settie JA - Instrumental Methods of Analysis. Skoog DA and West DM - Principles of Instrumental Analysis.
3. Hand book of Analytical Instrument Technology, Vol-11, Analysis Instruments, Butter worths Scientific Publication, London.

EI- 506 MATLAB

MATLAB Windows MATLAB Basics – Variables and Arrays, initializing Variables in MATLAB, Multidimensional Arrays, Sub Arrays, Displaying Output data, Data files, Scalar and Array Operations, Introduction to Plotting Branching Statements and Program Design.
Loops User Defined Functions, Input/Output Functions, Handling Graphics Toolboxes and simulation using Simulink environment

REFERENCES:

1. Basic of MATLAB by Rudhra Pratap
2. A Guide to MATLAB for Beginners and Experienced Users – Hunt Lipsman & Rosenberg
3. An introduction to programming and numerical Methods in MATLAB – S.R. Otto & J.P.Denier
4. Essential MATLAB for Engineers and Scientists – Brian D. Hahn & Deniel T. Valentine
5. Introduction to MATLAB – Sikander M. Mirza
6. Introduction to Simulink with Engineering Applications – Steven T. Karris

EI-507 Industrial Training

Duration: 2 weeks after the IV semester in the summer break. Assessment in V semester.

SCHEME OF EXAMINATION

For the assessment of industrial training undertaken by the students, following components are considered with respective weightage.

A) Term work In Industry Marks allotted

1. Attendance and General Discipline	25	
2. Daily diary Maintenance	25	
3. Initiative and Participative attitude during training	25	
4. Assessment of training by Industrial Supervisor/s	25	
Total		100

(B) Practical/Oral Examination (Viva-voce In Institution Marks allotted

1. Training Report	20
2. Seminar and cross questioning (defense)	30
Total	50

Marks of various components in industry should be awarded to the student, in consultation with the Training and Placement Officer (TPO)/ Faculty of the institute, who must establish contact with the supervisor/ authorities of the organization where, students have taken training, to award the marks for term work. During training, students will prepare a first draft of the training report in consultation with the section Incharge. After training they will prepare final draft with the help of the TPO/ faculty of the institute. Then, they will present a seminar on their training and will face viva-voce on training in the institute

EI 601 – VLSI Circuits & Systems

Unit-I

Crystal Growth and Wafer preparation: Wafer terminology, Different crystalline orientations, CZ method, CMOS IC Design flow, Crystal Defects. Fabrication processes of FETs, MOSFETs, and BIMOS etc.

Unit-II

Layering: Epitaxial growth methods, Oxidation; Kinetics of oxidation, Thin film fabrication, Metallization; Physical Vapor Deposition, Sputtering.

Unit-III

Patterning: Lithography; Optical Lithography, Electron Lithography, X-ray Lithography, Ion Lithography. Photo masking steps, Resists. Doping: Diffusion; Diffusion Models, Ion Implantation; Implantation Equipment, Channeling.

Unit-IV

VLSI process techniques and Integration: Floor planning, layout, Design rules, stick diagrams, Test generation, Logic simulation, Introduction to EDA tools. Contamination Control; Clean rooms, HEPA, ULPA Filters and Class numbers.

Unit-V

Subsystem Design: Data-paths; adder, Shift registers ALU, Memory; NVRWM, Flash memories, 6-Transistor RAMs. Latch up in CMOS Circuits.

REFERENCES:-

1. S.K.Gandhi, VLSI Fabrication principles, Wiley.
2. S.M. Sze, VLSI Technology, II edition, McGraw Hill.
3. P.Van Zant, Microchip Fabrication, A Practical Guide to Semiconductor Processing, Third Edition, McGraw Hill.

EI- 602– Optical Instruments & Sensors

Unit-I

Introduction to vector nature of light, Propagation of light, Propagation of light in a cylindrical dielectric rod, ray model, wave model. Theory of image formation, Review of aberration, Comma, acclamation, distortion, Chromative aberration, Osages

Unit-II

Different types of optical fibres, model analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation.

Unit-III

Optical fiber in instrumentation use of optical fibers as sensors, modulation techniques for sensors fiber optic power measurement. Stabilized calibrated light sources end-to-end measurement of fiber losses, optical signal processing.

Unit-IV

Optical power meters, optical attenuators, optical spectrum analyzer, optical switching & logic gate and measurement techniques like Optical time domain reflectometry, (OTDR), Attenuation measurements

Unit-V

Optical Sources & detectors: LED and LASERS, photo detectors, pin detectors detector responsitivity – noise, optical receivers. Integrated optical devices

LIST OF EXPERIMENTS;-

1.Optical Instrumentation and Sensors
4. Setting up Fiber Optic Analog Link and Digital Link
5. Study of Intensity Modulation Technique using Analog input signal
6. Pulse Width Modulation in Fiber Optic Link.
7. Measurement of propagation or attenuation loss in optical fiber.
8. Measurement of bending loss in optical fiber.
9. Numerical Aperture (NA) of the fiber.
10.Study of Diffraction gratings.
11.Study of Michelson Interferometer.
12.Study of Reflection Holography.
13.Study of Transmission Holography

REFERENCES:-

1. An Introduction to Fiber Optics by Cherin
2. Optical fiber – System Technology, design and applications by C.K. Rao
3. Optical Fiber Sensors, Vol.12 by Culshaw B. and Dakin J. (Ed.), Arctech House
4. Fundamentals of Fiber Optics in Telecommunications and sensor, by B.P. Pal, Wiley Eastern
5. Optical Fiber Communication by G. Kelser, McGraw Hill
6. Liu- Principles & Application of Optical Communication 1st ed., TMH
7. Ghatak- Optics 4th ed., TMH
8. Keiser- Optical Fiber Communication 4th ed., TMH

EI- 603 – Digital Signal Processing

Unit - I

The Discrete Fourier Transform: Discrete Fourier series, Discrete Fourier Transform (DFT),properties of DFT, linear convolution using the DFT, two dimensional DFT

Unit - II

Flow Graph and Matrix Representation of Digital Filters :Signal flow graph representation of digital network, matrix representation, basic network structures for IIR and FIR systems, Telligen's theorem for digital filters and its applications.

Unit - III

Digital filter Design Techniques: Design of IIR and FIR digital filters, computer aided design of IIR and FIR filters, comparison of IIR and FIR digital filters.

Unit-IV

Computation of the Discrete Fourier Transform: Goertzel algorithm, FT algorithms, decimation in time and frequency ,FFFT algorithm for N a composite number, Chirp Z transform(CZT).

Unit-V

Discrete Random Signals: Discrete time random process ,averages spectrum representations of infinite energy signals, response of linear system to random signals.

Power Spectrum Estimation :Basic principles of spectrum estimation, estimates of the auto covariance, power spectrum, cross covariance and cross spectrum.

REFERENCES:-

1.A.V.Oppenheim and R. W. Schafer," Digital Signal Processing", Prentice Hall, 1975
2.L.R.Rabiner and B. Gold," Theory and Application of Digital Signal Processing", Prentice Hall 1989

EI- 604 – Medical Instrumentation

Unit I

Introduction to the physiology of cardiac, nervous and muscular and respiratory systems. Neuromuscular interface Transducers and electrodes : Different types of transducers selection for Biomedical applications, Electrode theory, different types of electrodes Hydrogen Calomel, Ag~AgCl, pH, P02, PC02 electrodes, selection criteria of electrodes.

Unit II

Cardiovascular measurement The heart and other cardio vascular systems, Measurement of Blood Pressure, Blood flow, Cardiac output and Cardiac rate, Electrocardiography, Phonocardiography, Plethysomography, Magnet- Cardiography, Cardiac pace-maker, Defibrillator, Computer applications.

Unit III

Measurement of Electrical Activities in Muscles and Brain Electromyography, Electroencephalograph and their interpretation. Respiratory System Measurement Respiratory mechanism, Measurement of gas volume, flow rate carbon dioxide and oxygen concentration in inhaled air, respiratory controller.

Unit IV

Instrumentation for Clinical Laboratory: Measurement of pH value of blood, ESR measurements, Hemoglobin measurement, oxygen and carbon dioxide concentration in blood, GSR measurement, polar graphic measurements, Lasersur medicine.

Unit-V

Medical Imaging: Ultrasound imaging, Radiography, MRI, Electrical Tomography and applications. Biotelemetry. Transmission and Reception aspects of Biological signal via long distances. Aspect of PatientCare Monitoring. Electrical shock hazards and prevention.

Suggested Instructional Strategies

Instructional stress will be given on study of various systems of human body. Lectures on Transducers and Electrodes and lab work on study of various types and electrodes will be performed. Class room input on various topics will be provided. Related assignments and tutorials will be given to the students. Lab work on Cardio-vascular measurements may be performed. Exposure of Electrophysiological signal analysis using computer may also be given as lab work. Elaborated lectures and discussions maybe held on topics related to measurement of electrical activity of muscle and brain. Using computer signal analysis of EEG and EMG may be carried out as lab work.Periodic assignments and tutorials may be given.Theory lectures will cover the topics of the unit. Periodic assignments and tutorials may be given.Classroom input and discussions will be given for every topic of the unit. Periodic assignments and tutorials may be given Apart from these, Seminar presentation and Minor project development work in related field will be done.

List of Experiments

1. To record and study ECG of a person.
2. To record and study EEG of a person.
3. To record and study EMG of a person.
4. To analyze ECG using a computer.
5. To analyze EEG & EMG using a computer.
6. To measure blood pressure of a person.
7. To measure various respiratory volumes and parameters of a person.

REFERENCES:-

1. Biomedical Instrumentation – Pfiffer, Chromvell – PHI
2. Medical Instrumentation – Webster – Willey
3. Medical Instruments & Measurement – Carr – Asia Pearson
4. Handbook & Biomedical Instrumentation –R.S. Khandpur – TMH

EI – 605 Management Information System

Unit-I

The meaning and role of MIS

What is MIS, Decision support systems, systems approach, The systems view of business, MIS organization within the company. Management organizational theory and the systems approach: Development of organizational theory, Management and organizational behavior, Management information and the systems approach.

Unit-II

Information systems for decision-making:

Evolution of an information system, Basic information systems, Decision making and MIS, MIS as technique for making programmed decisions, design assisting information systems. Strategic and project planning for MIS General business planning, appropriate MIS response, MIS planning-general, MIS planning-details.

Unit-III

Conceptual System Design

Define the problems, Systems objectives, Establish system constraints, Determine information needs, Determine information sources, Develop alternative conceptual designs and select one, Document the system concept, Prepare the conceptual design report.

Detailed System Design

Information and involve the organization, arm of detailed design, Project management of MIS detailed design. Identify dominant and trade off criteria define the subsystems, Sketch the detailed operating MIS systems and information flows, Determine the degree of automation of each operation, inform and involve the organization again, Inputs, Outputs and processing, early system testing, Software, Hardware and tools, propose an organization to operate the system, Document the detailed design., Revisit the manager user.

Unit-IV

Implementation, Evaluation and Maintenance of the MIS

Plan the implementation, Acquire floor space and plan space layouts organized for implementation, Develop procedures for implementation, Train the operating personnel, Computer related acquisitions, Develop forms for data collection and information dissemination, Develop the files, Test the system, Cut over, Document the system, Evaluate the MIS, Control and maintain the system.

Unit-V

Pitfalls in MIS Development

Fundamental weaknesses, Soft spots in planning, Design problem, Implementation the TAR PITF.

REFERENCES:-

1. Murdick R.G., Russ J.B., Clagget J.R., Information Systems for modern management. Effy OZ, Management Information Systems, 3rd edition, Thomson.
2. Jawadekar W.S., Management Information System.
3. Brien J.A.O., Irwin, Management Information Systems, McGraw Hill.
4. Dour's G.B., Olson M.H., Management Information Systems, 2nd edition, McGraw Hill.
5. Thireramp R.J., Decision Support Systems for Effective Planning and Control, PHI.
6. Sadagopan S., Management Information Systems, 4th edition, Prentice-Hall of India

EI-606 Minor Project & Seminar

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with demonstration of the working system.

EI- 701 – Digital Control Systems

Unit-I

Modeling of Digital Control System Block diagram of sampled data / digital control system, Discrete LTI systems characterized by difference equations Sampling process and its frequency domain analysis, Idea sampler, Sampling theorem & Nyquist frequency, Data conversion techniques uses of A/D, D/A and ZOH elements.

Unit-II

Discrete System Modeling Definition and determination of the Z-plane and Z-transform, Mapping between S-plane and Z-plane, Z-transform theorems, The inverse Z-transform, Z-transform of system equations, Solution of linear difference equations using Z-transform, The pulse response, Block diagram reduction for systems interconnected through samplers, Signal flow graphs for hybrid systems.

Unit-III

Discrete Control Analysis Stability studies using Routh's test & Jury's test, Steady state error Analysis for stable systems, Root locus Analysis, Correlation between time Response & frequency response.

Unit-IV

Discrete Transform Analysis Folding / Aliasing, Transformation Methods between planes (s, z and w), Numerical solution differential, Equations, Jordon transformation, Backward forward & canonical difference, Pseudo continuous-time (PCT) Control system.

Unit-V

Discrete state Variable Analysis State variable representation, Time domain state and output equations for sampled data control system, State variable representation of a discrete time SISO system using phase variables - canonical variables - physical variables, State transition equation, State variable representation in the z-domain, System stability, Time response between sampling instants.

REFERENCES:-

1. Kuo, “Digital Control System”, Oxford Press.
2. Ogata, “Digital Control System”, PHI.
3. Gopal M., “Digital Control System”, TMH.
4. Santina, Subberud and Hosteller, “Digital Control System Design”, Oxford University Press.
5. Chen, “Analog & Digital Control System Design, Oxford University Press.

List of Experiments

1. Overview of the MATLAB Environment for control system.
2. Step Response of 1st and 2nd order systems in MATLAB.
3. Analysis and Designing of bode plot using MATLAB.
4. Analysis and Designing of Root locus using MATLAB.
5. Introduction to Simulink for Control System.
6. To study of PID controller with Simulink.
7. Introduction of State Spaces design in MATLAB.
8. Test of Controllability and Observability.
9. Determination of state transition matrix
10. Introduction to LTI viewer.
11. Design of digital compensators, Lag, Lead-Leg.

EI- 702 – Process Control Instrumentation

Unit-I

Introduction: Historical Perspective, incentives of process control, synthesis of control system. Classification and definition of process variables.

Mathematical modeling: Need and application of mathematical modeling, Lumped and distributed parameters, Analogies, thermal, Electrical, and chemical systems, Modeling of CSTR, Modeling of heat exchanger, Interactive and non-interactive type of system, Dead time elements, Developing continuous time and discrete time models from process data.

Unit-II

Control Modes: Definition, Characteristics and comparison of on-off, proportional, Integral, Differential, PI,PD, PID, Dynamic behavior of feedback controlled processes for different control modes, Control system quality, IAE, ISE, IATE criterion, Tuning of controllers Ziegler-Nichols, Cohen-Coon Methods, controller trouble shooting.

Unit-III

Realization of Control Modes: Realization of different control modes like P, I, D in Electric, Pneumatic, Hydraulic controllers.

Unit-IV

Actuators: Hydraulic, Pneumatic actuators, Solenoid, E-P converters, control valves, Types, Functions, Quick opening, Linear and equal percentage valve, Ball valves, Butterfly valves, Globe valves, Pinch valves, valve application and selection, Cavitations and flashing, Dampers and variable speed Drives.

Unit-V

Advanced Controls: Introduction to advanced control system like Cascade, Feed forward, Ratio, Selective, Override, Split range and Auctioneering control, Plant wide control.

PI Diagrams: Symbols, Terminology, Case studies.

REFERENCES:-

1. Dale Patrick, Stephen Fardo, “Industrial Process Control System”. Shinskey F.G., “Process Control System”, III Ed., McGraw Hill.
2. Smith C.A. & A.B. Corripio, “Principle & Practiced Automatic Process Control”, J. Willey.
3. Rao M & S.Qiv, “Process Control Engg.” Gorden & Breach.
4. George Stephanopoulos “ Chemical Process Control” PHI, Delhi
5. C.D. Johnson “Process control instrumentation technology’ PHI Harriott- Process Control 1st ed., TMH
6. Patranabis- Principles of Process Control 2nd ed., TMH

List of Experiments:-

1. Designing of continuous electronics controllers, (P, I, D, PI, PD, PI D)
2. Study of Electro - Pneumatic Trainer kit and Pneumatic control valves.
3. Controlling of Temperature of water by continuous controllers (P, I, D, PI, PD, PI D).
4. Study of P to I converter and it's Interfacing to electro-pneumatic kit.
5. Study of I to P converter and it's Interfacing to electro-pneumatic kit.
6. Study of PLC and ladder diagram programming.
7. Controlling of flow meter through PLC.
8. Controlling of Bottling plant through PLC.
9. Controlling of Water level through PLC.
10. Implementation of traffic light control through PLC.
11. Controlling of stepper motor through PLC.
12. Study of rotary encoder and its controlling through PLC.

ELECTIVE-I
EI 7001 DSP Application

UNIT I :
An introduction to DSP Processors: Advantages of DSP ,characteristics of DSP systems ,classes of DSP applications.DSP processor embodiment and alternatives,Fixed Vs Floating point processors,fixed point and floating point data path.

UNIT II :
DSP Architecture : An intoduction to Harvard Architecture,Differentiation between Von-Neumann and Harvard Architecture,Quantization and finite word length effects,Bus structure ,Central Processing unit – ALU ,Accumulators ,Barrel shifters, MAC unit,compare ,select ,and store unit (CSSU) ,data addressing and program memory addressing

UNIT III :
Memory architecture :Memory structures ,features for reducing memory access required ,wait states,external memory interfaces,memory mapping – data memory, program memory, I/O memory memory mapped registers .Addressing: Various addressing modes –implied addressing,immediate data addressing,memory direct addressing ,register direct and indirect addressing and short addressing modes.
Instruction set : Instruction types , various types registers,orhogonality assembly language and application development.

UNIT IV:
Execution Control and pipelining: Hardware looping, interrupts, stack, pipelining and performance, pipelining depth, interlocking, branching effects, interrupt effects, instruction pipelining,. Peripherals: Serial ports, timers, parallel ports, Bit input/output ports, Host ports, communication ports, on-chip A/D and D/A converters, external interrupts, on-chip debugging facilities, power consumption and management.

UNITV:
Processors: Architecture and instruction set of TMS320C3x, TMS320C5x, TMS320C6x,ADSP21xx DSP chips, some examples programs. Recent trends in DSP system Design: FPGA based DSP system design, advanced development tools for FPGA, development tool for programmable DSP's- An introduction to Code composer studio.

REFERENCES:-

1. 1.P.Lapsley,J.Bier,A.Shoham,E.A.lee:DSP processor fundamentals: Architectures and Features,IEEE
2. Press series on signal processing,IEEE.
3. B venkataramani and M bhaskar: Digital signal Processors: Architectures, programming and applications,TMH.

ELECTIVE-I
EI 7002 ENVIRONMENTAL INSTRUMENTATION

Unit-I

Characterization of waste and sources of pollution. Effects of pollution-ecological balance, Quality Standards and legislation.

Unit-II

Air pollution: Emission intensity and dispersion measurement and analysis techniques Photometric, Gas chromatography, and Mass Spectroscopic analysis. Dust Collectors, Colorimetry and radioactivity detectors. Trace element detectors, Continuous pollution monitoring. Control of Air Pollution and control instrumentation.

Unit-III

Water Pollution: Effluents and their characterization, Concentration and Separation methods of measurement and analysis. Waste treatment by Biological, Physical and Chemical (Aeration, Sedimentation, Flotation Coagulation, Ion-exchange, Aerobic and Anaerobic digestion) process control and Instrumentation. Colorimetry and Spectroscopic remote sensing techniques and instrumentation.

Unit-IV

Land Pollution: Instrumentation in sludge handling radioactive waste disposal and safety instrumentation. Soil Characteristic and fertility conservation. Instrumentation for Noise and Thermal Pollution monitoring.

Unit-V

Control Instrumentation of Specific Industrial pollution in Steels, Paper, Cement, Power and Petrochemical Plants.

REFERENCES:-

1. Bond. R.G., C.P. Straub, Handbook of Environmental Control, Volume II. Jones Instrumentations series.

ELECTIVE-I
EI 7003 DIGITAL IMAGE PROCESSING

Unit-I

Digital Image Processing- Elements of a Digital Image Processing system, Structure of the Human eye, Image formation and contrast sensitivity, Sampling and Quantization, Neighbours of a pixel, Distance measures, Photographic file structure and exposure, File characteristics, Linear scanner, Video camera, Image processing applications.

Unit-II

Image Transforms-Introduction to Fourier transform-DFT, Properties of two dimensional FT, Separability, Translation, Periodicity, Rotation, Average value, FFT algorithm, Walsh transform, Hadamard transform, Discrete Cosine transform.

Unit-III

Image Enhancement- Definition, Spatial domain methods, Frequency domain methods, Histogram modify technique, Neighborhood averaging, Media filtering, Low pass filtering, Averaging of multiple images, Image sharpening by differentiation and high pass filtering.

Unit-IV

Image Restoration-Definition, Degradation model, Discrete formulation, Circulant matrices, Block circulant matrices, Effect of diagnolization of circulant and block circulant matrices, Unconstrained and constrained restorations , Inverse filtering, Wiener filter, Restoration in spatial domain.

Unit-V

Image Encoding-Objective and subjective fidelity criteria, Basic encoding process, The mapping, The quantizer, The coder, Differential encoding, Contour encoding, Run length encoding, Image encoding relative to fidelity criterion, Differential pulse code modulation.

REFERENCES:-

1. Rafael, C. Gonzlez., and Paul, Wintz, “Digital Image Processing”, Addison-Wesley Publishing Company.
2. Jain Anil K., “Fundamentals of Digital Image Processing”, Prentice Hall. Sosenfeld, and Kak, A.C., “Digital Image Processing”, Academic Press. William K. Pratt., “Digital Image Processing”, John Wiley and Sons.

ELECTIVE-II
EI 7004 INTELLIGENT INSTRUMENTATION

Unit-I

Intelligent versus Dumb instruments, A historical perspective of instrumentation systems. Review of digital transducers. Interfacing microcomputers. Computer ports to high power devices. Optical shaft encoder communication standards. Concepts of Real Time system and its application.

Unit-II

Details of Data Acquisition systems (DAS) Logic control systems, Continuous & Batch modes, Single and multi loop controller. Details of Data logger and its application.

Unit-III

Architecture of Virtual instrument and its relation to operating system. Software overview: LABVIEW, Graphical User Interface (GUI), Control and indicators: G programming- Data type, Data flow programming editing and running a virtual instrument.

Unit-IV

G Programming details in LABVIEW, G Programming tools and libraries. Programming structure: For loop, While loop. CASE structure, Sequence Structure arrays and clusters. Array operations- Bundle/Unbundled String and file I/O. High level and low level I/Os. Attribute nodes, Local and global variables.

Unit-V

Software development for Temperature (Low and High), Level, Speed, pressure etc.

REFERENCES:-

1. Barney G C, Intelligent Instrumentation: Micro processor application in measurement and control,
2. Prentice Hall, Engle Wood Cliff NJ.
3. H S Store, Micro Computer Interfacing, Addison Wesley, Reading, MA Rathore T S, Digital Instrumentation, TMH
4. Interfacing sensors to the IBM PC, Prentice Hall, Engle Wood Cliff NJ. Garry M. Johnson "LABVIEW Graphical Programming", TMH.
5. Lisa K. Wells "LABVIEW for Everyone, PHI.
6. Barry Paton, "Sensor, Transducers and LABVIEW", Prentice Hall.

ELECTIVE-II
EI 7005 EMBEDDED SYSTEMS

Unit-I

8 Bit Micro controllers: Introduction to MCS-51 family, Peripheral of MCS-51 family, PIC Micro Controller –CPU architecture, registers, instruction sets addressing modes, loop timing, On chip Peripherals of PIC, Motorola MC68H11 Family Architecture Registers, Addressing modes, Interrupts features of interrupts- Interrupt vector and Priority, timing generation and measurements, Input capture, Out capture.

Unit-II

16 Bit Micro controller: Introduction to MCS-96 family, Peripherals of MCS-96 family, 80196-architecture, CPU operation, memory organization, I/O port, Operand addressing, instruction set, Interrupts, On chip Peripherals-PWM, Timers, HIS/HSO, Serial Port, External memory interfacing.

Unit-III

32 bit Micro controller: Intel 80960-architecture, memory address space, Salient features of ARM processor family-ARM7 /ARM9/ ARM9E/ ARM10/ ARM11/ Secure Core /Strong ARM, XScale technology, ARM9200 Architecture,Pinouts, Peripheral Identifier, System Interrupts, External Interrupts, Product memory mapping, External memory mapping, Internal memory mapping, On chip Peripherals-Memory controllers, external Bus Interface(EBI), Advanced interrupt controller(AIC), USART, Timer counter.

Unit-IV

Software development and tools: Embedded system evolution trends. Round- Robin, Roundrobin with Interrupts, function- One- Scheduling Architecture, Algorithms. Introduction to assembler- compiler- cross compilers and Integrated Development Environment (IDE) Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

Unit-V

Real Time Operating Systems: Task and Task States, tasks and data, semaphores and shared Data Operating system Services- Message queues- Timer Function- Events- Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS.

REFERENCES:-

1. David E Simon, " An embedded software Primer" Pearson education Asia.
2. John B Peat man " Design with Micro controller" Pearson education Asia.
3. Jonartthan W. Valvano Brooks/cole " Embedded Micro Computer Systems. Real time interfacing", Thomson learning

ELECTIVE-II
EI 7006 NUCLEAR INSTRUMENTAION

Unit-I

General Introduction to Properties of Nuclear Systems and Radiation, Interaction of radiation with matter, Radioactive sources-Choice of isotopes. Radiation detectors-Ionization chambers, Geiger-Muller counters, Scintillation counters, Semiconductor devices, Neutron detectors based on recoil, Measuring circuits including modulators, converters and stabilizers, Synchronous detectors. Counting Statistics, Correlation sets, Standard deviation of rate meters, Error propagation, Effect of background, Statistical distribution of pulse height distribution, Detector efficiency.

Unit-II

Nuclear Reactor Instrumentation

Diffusion, moderation, absorption and delay processes, Neutron flux measurement, Control rod calibration, Nuclear fuel inspection and testing including poisoning, Radiation energy measurement, Remote control instrumentation, Nuclear instrument maintenance.

Unit-III

Application to industrial System

Radioactive Tracer technique, Gas and Liquid flow measurement, Leak detection, Residence time and its distribution, application to blending corrosion and wear studies Thickness and density measurement by beta rays, Gamma rays absorption technique, measurement of thickness of surface material by back scattering.

Unit-IV

Level detection by radioactive devices, interface detection by neutron moderation technique. Measurement of gas pressure and gas analyzers, Speceros-copic and frequency methods.Void detection, a idity meter, moisture meter, smoke detection, Ozonizer, Radiochromatography and interferometry.Portable instruments, Source activity for dynamic properties of instruments.

Unit-V

Safety

Hazards of ionization radiation, physiological effect of radiation, Dose and Risk, Radiological protection (Alpha, beta and Gamma, X, Neutron), Shielding material and effectiveness. Operational safety instruments, emergency schemes, effluent disposal, Application to medical diagnosis and treatment.

REFERENCES:-

1.Ed. Noltingk, B.E., "Instrumentation Reference Book, Butterworth
2.Heinemenn. Boltan W., Newness, "Instrumentation and Measurement, Newness. Jones, "Instrumentation Series",

ELECTIVE-III
EI 7007 ADVANCE INDUSTRIAL ELECTRONICS

Unit-I

Introduction to modern power conductor devices: Gate turn off thyristor (GTO), Insulated Gate Bipolar Junction Transistor (IGBT), Power BJT, Power MOSFET, MOS controlled thyristor (MCT), Reverse conducting thyristor (RCT), Smart Power Devices (Power ICs) Rating, Static and dynamic characteristics, Safe operating areas, Protections of devices, Devices selection.

Unit-II

DC to DC conversion, Buck Boost and Buck Boost converters (Circuit Configuration and analysis with different types of loads) Power factor, Harmonics and effect of source inductance in converter circuits. Resonant DC, DC converters. Switched mode power supply (SMPS).

Unit-III

Concept of PWM in converters, Unity power factor converters, Voltage source inverters (VSI), Current source inverters (CSI). Application of VSI and CSI in induction motor control.

Unit-IV

Non Drive applications of power electronics inverters, Uninterrupted power supply (UPS), Induction heating, Metal cutting, Active power line conditioning.

Unit-V

Vector controlled and slip power controlled induction motor drives, Application of microprocessor, Micro controllers and DSP in Machine drives.

REFERENCES:-

1. MH Rashid, Power Elex, PHI
2. J.G. Kassakian, MF Schlecht and G.C. Verghese "Principle of Power Electronics", Reading, MA, Addison Wesley.
3. Dubey G.K., " Power Semiconductor Controlled Drives", Engle Wood Cliffe NJ, Prentice Hall. DC Griffith, " Uninterruptible power supply", Marcell Dekker, NY.
4. P. Vas, "Vector control of AC motors", Oxford Press.

ELECTIVE-III
EI 7008 SCADA SYSTEMS AND APPLICATIONS

Unit I

Introduction to SCADA and PLC:SCADA: Data acquisition system, evaluation of SCADA, communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Ladder diagram, Functional Block diagram, Applications, Interfacing of PLC with SCADA.

Unit II

SCADA system components: Schemes, Remote Terminal Unit, Intelligent Electronic Devices, Communication Network, SCADA server.

Unit III

SCADA Architecture-Various SCADA Architectures, advantages and disadvantages of each system, single unified standard architecture IEC 61850 SCADA / HMI Systems.

Unit IV

SCADA Communication-Various industrial communication technologies- wired and wireless methods and fiber optics, open standard communication protocols.

Unit V

Operation and control of interconnected power system-Automatic substation control, SCADA configuration, Energy management system, system operating states, system security, state estimation, SCADA applications Utility applications, transmission and distribution sector operation, monitoring analysis and improvement. Industries oil gas and water. Case studies, implementation, simulation exercises.

REFERENCES:-

1. Stuart A Boyer: SCADA supervisory control and data acquisition.
2. Gordan Clark, Deem Reynders, Practical Modem SCADA Protocols.
3. Sunil S. Rao, Switchgear and Protections, Khanna Publication.

ELECTIVE-III
EI 7009 DATA COMMUNICATION AND COMPUTER NETWORKS

Unit I

Basic data communication concepts:

Introduction to Data communication, channel capacity, parallel and serial transmission, Asynchronous and Synchronous transmission, Simplex, Half Duplex and Full Duplex modes of transmission and their applications. Multiplexing strategies like TDM, FDM, WDM and SDM

Unit II

Data Interfaces and transmission:

Digital interface standards ; RS-232C standard and X.21 standard, connecting a DTE in RS-232 C. RS-449, RS-422A and RS-423A standards High speed desktop serial interfaces. Plesiochronous digital multiplexing hierarchy T carrier and E carrier. Introduction to ISDN, its interfaces and reference points. Need for Modems for data communication and their types.

Unit III

Communication Networks and its technology:

Concept of Circuit switching, message switching and packet switching, their comparison and application. Computer Networks and concept of layering, OSI reference Model, Introduction to TCP/IP protocol suite and comparison of the OSI TCP/IP layered Models. Classification of networks under the heading LAN, WAN and MAN and their characteristics.

Unit IV

Physical and Data link layer:

Error detection techniques such as Parity check, Vertical and longitudinal redundancy check, CRC code and their error detecting capabilities. Data link layer issues Point to point and multipoint links, flow control, sliding window protocol, various ARQ techniques for error and flow control and their comparison, SDLC, HDLC as bit oriented link control

Unit V

Local Area Networks and its technology

Various transmission mediums for LAN different types of LAN topologies. Medium Access Control Techniques namely Contention, Token Passing and Polling. CSMA/CD and CSMA/CA. A brief survey of IEEE LAN standards. Comparative study of Ethernet, Fast Ethernet Gigabit Ethernet and 10 Gigabit Ethernet.

REFERENCES:-

1. Stalling W., *Data and Computer Communication*, PHI.
2. Tanenbaum, *Computer Networks,* PHI.
3. Forouzan B., *Data Communication and Networking*, TMH.

EI-706 Major Project (Planning & Lit.)

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with demonstration of the working system.

EI -707 Self Study (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

EI -708 Seminar / Group Discussion (Internal Assessment)

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.

EI-801 MAJOR PROJECT

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of the working system.

EI-802 Comprehensive Viva

The activities would include develop the following soft skills:-

(i) Engineering Knowledge
(ii) Aptitude
(iii) Logical Reasoning
(iv) Verbal Reasoning
(v) General Knowledge
(vi) Interview Techniques

References:

- http//www.indiabix.com
- http//placementpapers.students3k.com
- http//www.campusgate.co.in

EI -803 Seminar / Group Discussion (Internal Assessment)

Objective of GD and seminar is to improve the mass communication and convincing/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.