

3E11A ELECTRONIC DEVICES & CIRCUITS

**B.Tech. (EI) 3rd Sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	SEMICONDUCTOR PHYSICS - Mobility and conductivity, Charge densities in a semiconductor, Fermi Dirac distribution, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics, Carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, Diffusion and continuity equation, Transport equations, Mass action Law, Hall effect.	8
II	JUNCTION DIODES - Formation of homogenous and heterojunction diodes and their energy band diagrams, Calculation of contact potential and depletion width, V-I characteristics, Small signal models of diode, Diode as a circuit element, Diode parameters and load line concept, C-V characteristics and dopant profile. Applications of diodes in rectifier, Clipping, Clamping circuits and voltage multipliers, Transient behavior of PN diode, Breakdown diodes, Schottky diodes, and Zener diode as voltage regulator, Construction, Characteristics and operating principle of UJT.	8
III	TRANSISTORS - Characteristics, Current components, Current gains: alpha and beta. Variation of transistor parameter with temperature and current level, Operating point, Hybrid model, DC model of transistor, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of single stage CE, CC (Emitter follower) and CB amplifiers AC & DC load line, Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.	8
IV	JFET & MOSFET - Construction and operation, Noise performances of FET, Parasitic of MOSFET, Small signal models of JFET & MOSFET, Biasing of JFET's & MOSFET's, Low frequency single stage CS and CD (source follower) JFET amplifiers, FET as voltage variable resistor and FET as active load.	8
V	SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY - Analysis of BJT and FET multistage amplifier, DC and RC coupled amplifiers. Frequency response of single and multistage amplifier, mid-band gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem, use of Miller and bootstrap configuration. Cascade and cascode configuration of multistage amplifiers (CE-CE, CE-CB, CS-CS and CS-CD), Darlington pair.	8
TOTAL		40

TEXT BOOKS:

1. Integrated Electronics, Millman Halkias, T.M.H, (2001)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic devices & circuits theory, R.L. Boylestad, Louis Nashelsky , Pearson education	1978
2	Electronic devices & circuits, David Bell, Oxford Publications	2009
3	M Rashid – Microelectronic circuits : Analysis & Design, Cengage learning	1999
4	Millman, Electronics Devices and Circuits, TMH	2010
5	Electronic Devices,7e, Floyd, Pearson	2008
6	A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing	1991

3EI2A DATA STRUCTURES & ALGORITHMS

B.Tech. (EI) 3rd Sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	<p>DEFINITION & CHARACTERISTICS OF ALGORITHMS – Structures, Difficulties in estimating exact execution time of algorithms, Concept of complexity of program, Asymptotic notations: Big-Oh, theta, Omega-Definitions and examples, Determination of time and space complexity of simple algorithms without recursion, Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$</p> <p>ARRAYS: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.</p>	6
II	<p>ARRAYS AS STORAGE ELEMENTS for representing polynomial of one or more degrees for addition & multiplication, Sparse matrices for transposing & multiplication, stack, queue, Dequeue, Circular queue for insertion and deletion with condition for over and underflow, Transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned).</p> <p>EVALUATION OF EXPRESSION - Concept of precedence and associativity in expressions, Difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, Postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.</p>	10
III	<p>LINEAR LINKED LISTS - Singly, doubly and circularly connected linear linked lists- insertion, Deletion at/ from beginning and any point in ordered or unordered lists, Comparison of arrays and linked lists as data structures Linked implementation of stack, queue and de-queue, Algorithms for of insertion, deletion and traversal of stack, Queue, Dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists</p> <p>SEARCHING - Sequential and binary search</p>	8
IV	<p>NON-LINEAR STRUCTURES - Trees definition, Characteristics concept of child, Sibling, Parent child relationship etc, Binary tree: different types of binary trees based on distribution of nodes, Binary tree (threaded and unthreaded) as data structure, insertion, Deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.</p>	9
V	<p>GRAPHS - Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, Finding connected components and spanning</p>	7

	tree. Single source single destination shortest path algorithms SORTING - Insertion, quick, Heap, Topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. Note: 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.	
	TOTAL	40

Text Books:

1. Malik – Data structures using C++, Cengage Learning(2010)

References Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Drozdek – Data structures and algorithms in C++ , Cengage learning	2013
2	An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH	1984
3	Data Structures in C/C++, Horowitz, Sawhney, Galgotia	2001
4	Gilberg & Forouzan – Data structures: A pseudocode approach with c, Cengage learning	2004
5	Data Structures in C/C++, Tanenbaum, Pearson	2014
6	Data Structures in C++, Weiss, Parson	1992

3EI3A DIGITAL ELECTRONICS

**B.Tech. (EI) 3rd semester
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA - Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra, Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa, Converting logic diagrams to universal logic. Positive, Negative and mixed logic, Logic gate conversion.	8
II	DIGITAL LOGIC GATE CHARACTERISTICS - TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families, Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET, Interfacing logic families to one another.	6
III	MINIMIZATION TECHNIQUES - Minterm, Maxterm, Karnaugh Map, K-map upto 4 variables, Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions, Variable mapping. Quinn-Mc Klusky minimization techniques.	10
IV	COMBINATIONAL SYSTEMS - Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, Demultiplexer, Encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.	8
V	SEQUENTIAL SYSTEMS - Latches, Flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops, Counters: Synchronous & Asynchronous ripple and decade counters, Modulus counter, Skipping state counter, Counter design, State diagrams and state reduction techniques, Ring counter, Counter applications, Registers: Buffer register, Shift register.	8
TOTAL		40

TEXT BOOKS:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling, TMH (2004)
2. Digital Logic and Computer Design By M. Morris Mano, Pearson(1979)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Ghoshal – Digital Electronics, Cengage Learning	2012
2	Roth – Fundamentals of Logic design, Cengage learning	2014
3	Pulse and digital Switching waveforms By Millman Taub, TMH	1984
4	Fundamentals of Digital circuits, A. Anand kumar, PHI	2009
5	Leach, Digital Principles and Applications, TMH	1995
7	Digital Electronics: Principles and Integrated Circuits, Maini, Wiley	2007

3EI4A CIRCUIT ANALYSIS & SYNTHESIS

B.Tech. (EI) 3rd sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	NETWORK THEOREMS AND ELEMENTS - Thevenin's, Norton's, Reciprocity, Superposition, Compensation, Miller's, Tellegen's and maximum power transfer theorems. Networks with dependent sources. Inductively coupled circuits – mutual inductance, coefficient of coupling and mutual inductance between portions of same circuits and between parallel branches. Transformer equivalent, inductively and conductively coupled circuits.	8
II	TRANSIENTS ANALYSIS - Impulse, Step, Ramp and sinusoidal response analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems. Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit.	7
III	NETWORK FUNCTIONS - Terminals and terminal pairs, Driving point impedance transfer functions, Poles and zeros, Restrictions on pole and zero location in s-plane. Time domain behavior from pole and zero plot, Procedure for finding network functions for general two terminal pair networks, Stability & causality, Hurwitz polynomial, positive real function.	9
IV	TWO PORT NETWORKS - Two Port General Networks: Two port parameters (impedance, admittance, hybrid, ABCD and S parameters) and their inter relations. Equivalence of two ports. Transformer equivalent, interconnection of two port networks. The ladder network, image impedance, image transfer function, application to L-C network, attenuation and phase shift in symmetrical T and pi networks.	6
V	NETWORK SYNTHESIS - The four-reactance function forms, specification for reactance function. Foster form of reactance networks. Cauer form of reactance networks Synthesis of R-L and R-C and L-C networks in Foster and Cauer forms.	10
	TOTAL	40

TEXT BOOKs:

1. Network Analysis & Synthesis, Kuo, Wiley (2006)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Circuits And Networks: Analysis And Synthesis, Sudhakar, TMH	2006
2	Sivanagaraju – Electrical circuit analysis, Cengage learning	2009
3	Robbins – Circuit analysis : Theory and Practice, Cengage Learning	2012
4	Electrical Networks, Singh, TMH	2009
5	Electric Circuits, Nilsson, Pearson	2009
6	Linear Circuits Analysis, Decarlo, Oxford	2007
7	Basic Engineering Circuit Analysis, Irwin, Wiley	2010
8	Network Theory: Analysis And Synthesis, Smarjit Ghosh, PHI	2005
9	Electric Circuit Analysis, Xavier, S.P. Eugene, New Age	2007

3EI5A ELECTROMAGNETIC PROPERTIES OF MATERIALS**B.Tech. (EI) 3rd sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	DIELECTRICS MATERIALS - Introduction, Polarization, Polarizability, Different types of polarization, Electronic, ionic, Orientation and space polarization, frequency and temperature dependence of different polarization, Dielectric loss and loss tangent, energy store and loss in dynamic polarization, Phenomenon of spontaneous polarization and ferro-electricity, Ferroelectric hysteresis loop, Piezoelectricity, piezoelectric materials: Quartz, Rochelle salt and PZT , Applications of dielectrics.	7
II	MAGNETIC MATERIALS - Introduction, magnetization, theory of Dia, Para, Ferro- Ferrimagnetism and antiferromagnetism, Weiss field and magnetic domains, BH hysteresis loop, soft and hard magnetic materials and their applications, magnetic energy. Magnetostriction, giant magnetostriction resistor (GMR) and engineering applications of it. Magnetic spin, new electronic devices based on magnetic spin	8
III	SEMI CONDUCTOR MATERIALS - Introduction, Energy band gap structures of semiconductors, Classifications of semiconductors, Degenerate and non-degenerate semiconductors, Direct and indirect band gap semiconductors, Electronic properties of Silicon, Germanium, Compound Semiconductor, Gallium Arsenide, Gallium phosphide & Silicon carbide, Variation of semiconductor conductivity, resistance and bandgap with temperature and doping. Thermistors, Sensitors.	9
IV	CONDUCTIVE & SUPERCONDUCTIVE MATERIALS - Electrical properties of conductive and resistive materials. , Energy bandgap structures of metals, resistivity of conductors and multiphase solids, Matthiessen's rule, Important characteristics and electronic applications of specific conductor & resistance materials, Superconductor phenomenon, Type I and Type II superconductors. Theory of superconductors, High temperature superconductors and their applications.	8
V	NANOMATERIALS - Introduction, Change in band structure at nano-stage. Structure of Quantum dots (nano-dots) & Quantum wires, Fabrication & Characterization of nanomaterials, Structure of single wall and multi-wall carbon nanotube (CNT), Change in electrical, Electronic and optical properties at nano stage, Potential applications of nano materials.	8
	TOTAL	40

TEXT BOOKS:

1. Kasap, Principles of Electronic Materials and Devices, TMH (2005).
2. Robert M Rose, Lawrence A. Shepard and Jhon Wulff, The structure and peroperties of materials vol.4 (Electronic properties), Willey Eastern University press. (2011)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Askeland – The science and engineering of materials, Cengage learning	2005
2	Electronic Materials and Processes, Kaul Bhan & Jain, Genius publications	2013
3	Allison, Principles of Electronic Materials and Devices, TMH	2005
4	Neamen, Semiconductor Physics and Devices, TMH	2009
5	Guozhong Cao, Ying Wang Nanostructures and Nanomaterials Synthesis, Properties and Applications, World Scientific Series in Nanoscience and Nanotechnology	2011
6	Dekker, Electrical properties of materials	1995

3EI6A ADVANCED ENGINEERING MATHEMATICS I

B.Tech. (EI) 3rd sem
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	LAPLACE TRANSFORM - Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficients with special reference to the wave and diffusion equations.	8
II	FOURIER SERIES & Z TRANSFORM – Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Z TRANSFORM - Introduction, Properties, Inverse Z Transform.	8
III	FOURIER TRANSFORM - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.	8
IV	COMPLEX VARIABLES - Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy's theorem. Cauchy's integral formula.	8
V	COMPLEX VARIABLES -Taylor's series Laurent's series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration.	8
TOTAL		40

TEXT BOOKS

1. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley (2010)
2. Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers, 3/e Croft, Pearson (2009)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Datta – Mathematical methods of science and engineering, Cengage Learning	2006
2	O'neil – Advanced engineering mathematics, Cengage learning	2012
3	Engineering Mathematics, T Veerarajan, TMH	2005
4	Advance Engineering Mathematics, Potter, Oxford	2005
5	Mathematical Methods, Dutta, D., New Age	2006
6	Elementary Number Theory with applications: Thomas Koshy, 2 nd Ed., Elsevier.	2007
7	Engineering Mathematics III By Prof. K.C. Sarangi and others, Genius publications	2013
8	Engineering Mathematics, Babu Ram, Pearson	2009

3EI7A ELECTRONIC INSTRUMENTATION WORKSHOP

B.Tech. (EI) 3rd Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	Identification, Study & Testing of various electronic components : (a) Resistances-Variety types, Colour coding (b) Capacitors-Variety types, Coding, (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers .
2	Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.
3	To study and perform experiment on CRO demonstration kit.
4	Soldering & Desoldering practice.
5	To Design & fabricate a PCB for a Regulated power supply. Assemble the Regulated power supply using PCB and test it.
6	To study and plot the characteristics of following Opto-Electronic devices –(a) LED (b) LDR (c) Photovoltaic cell (d) Opto-coupler (e) Photo diode (f) Photo transistor (g) Solar cell
7	To study the specifications and working of a Transistor radio (AM & FM) kit and perform measurements on it.
8	To study the specifications and working of a Public address System.
9	To prepare design layout of PCBs using software tools.
10	To fabricate PCB and testing of electronics circuit on PCB.
11	To design and test Switch Mode Power Supply using ICs
12	To study the specifications and working of a DVD Player.
13	To study the specifications and working of LCD TV.
14	To study the specifications and working of LED TV.

3EI8A COMPUTER PROGRAMMING LAB-I

B.Tech. (EI) 3rd Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structures.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

3EI9A ELECTRONIC DEVICE LAB**B.Tech. (EI) 3rd Sem.****Max. Marks: 75****2P****Exam: 3 H**

S.No.	Contents
1	Study the following devices: (a) Analog & digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
2	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
3	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
4	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product
5	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{dss} & V_p
6	Application of Diode as clipper & clamper
7	Plot gain- frequency characteristic of two stage RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
8	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
9	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters
10	Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.
11	Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

3EI10A DIGITAL ELECTRONICS LAB

B.Tech. (EI) 3th Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table.
9	Construct a divide by 2, 4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However experiment Nos. 1-4 are to be performed on bread board only

3EI11A BUSINESS ENTREPRENEURSHIP**B.Tech. (EI) 3th Sem.****Max. Marks: 50****2P****Exam: 3 H**

S.No.	Contents
1	Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2	Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.
3	Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4	Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.
5	Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

TEXT BOOKS:

1. Rajeev Roy – Entrepreneurship Oxford Uni.. (2009)

REFERENCES BOOKS:

1. Bouchoux – Intellectual property: trademarks, copyrights, patents and trade secrets, Cengage learning. (2008)
2. Daft – Leadership, Cengage learning. (2014)
3. Kuratko/Rao – Entrepreneurship : A South asian perspective, Cengage learning. (2012)

4EI1A ANALOG ELECTRONICS

B.Tech. (EI) 4th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	FEEDBACK AMPLIFIERS - Classification, Feedback concept, Feedback Topologies, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion. Compensation techniques, miller compensation.	9
II	OSCILLATORS & Multivibrators - Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger. Blocking oscillators.	7
III	HIGH FREQUENCY AMPLIFIERS - Hybrid Pi model, Conductances and capacitances of hybrid Pi model, high frequency analysis of CE amplifier, gain bandwidth product, unity gain frequency f_T , Emitter follower at high frequencies.	8
IV	TUNED AMPLIFIER - Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary & Secondary Tuned Amplifier with BJT & FET, Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier, class C tuned amplifiers, Shunt Peaked Circuits for Increased Bandwidth.	7
V	POWER AMPLIFIERS - Classification, Power transistors & power MOSFET (DMOS, VMOS). Output power, power dissipation and efficiency analysis of Class A, class B, class AB, class C, class D and class E amplifiers as output stages. Pushpull amplifiers with and without transformers, Complementary symmetry & quasi complimentary symmetry amplifiers	9
	TOTAL	40

TEXT BOOK

1. Millman, Integrated Electronics, TMH.(1972)
2. A. S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford University Press.(2007)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	M. H. Rashid, Microelectronic Circuits Analysis and Design, Cengage Learning	2010
2	Electronic Devices and Circuits–II, R.Tiwari, Genius publications	2013
3	Salivahnan, Electronics Devices and Circuits, TMH.	1998
4	Fundamentals of Analog Circuits 2e, Floyd, Pearson	2012
5	David A. BELL, Electronic Devices and Circuits, Oxford University Press.	2009

4EI2A CONTROL SYSTEM – I

**B.Tech. (EI) 4th sem.
3L+1T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION - Concepts of open loop and closed loop control systems. Examples and applications of open loop and closed loop systems. Sensitivity of control systems to parameter variations. Mathematical Modeling of Physical Systems : Representation of physical system (Electro-mechanical) by differential equations. Determination of transfer function by block diagram reduction techniques and signal flow method, Laplace transformation, Inverse Laplace transformation.	8
II	CONTROL SYSTEM COMPONENTS - Potentiometers, synchros, Armature & Field controlled DC servomotors, AC servomotors, stepper motor and ac tacho generator.	6
III	TIME RESPONSE ANALYSIS OF FIRST ORDER AND SECOND ORDER SYSTEM - Transient response analysis. Steady state error and error constants. Absolute stability and relative stability. Routh's stability criterion.	9
IV	STABILITY OF THE CONTROL SYSTEM - Root locus method of analysis. Polar plots. Nyquist stability criterion. concept of Gainmargin and phasemargin, M and N Locii. Nichols Chart.	9
V	FREQUENCY DOMAIN ANALYSIS - Bode plot, Design specification in frequency domain and their co-relation with time domain. COMPENSATING NETWORKS - Lag, Lead and Lag lead networks. Brief idea of proportional, derivative and integral controller.	8
	TOTAL	40

TEXT BOOK

1. Modern control Engineering, Ogata, Pearson.(2009)
2. Nise's Control System Engineering, Rajeev Gupta, Wiley (2011)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Control Systems: Principles & Design, M. Gopal, TMH	2002
2	1. Automatic Control System,B. C. Kuo,Wiley	2009
3	Singh & Janardhanan - Modern control engineering, Cengage learning	2010
4	Control Systems,Srivastava,TMH	2009
5	Systems and Control - Stanislawhizak, Oxford	2002
6	Control System Engineering,S. K. Bhattacharya,Pearson	2009
7	Control Systems: Theory And Applications,Ghosh,Pearson	2004
8	Manik – Control systems, Cengage learning	2012

4EI3A ELECTRICAL MEASUREMENTS

**B.Tech. (EI) 4th sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Measuring Instruments - Moving coil, moving iron, Electrodynamic and induction instruments-construction, operation, torque equation and errors. Applications of instruments for measurement of current, voltage, single-phase power and single-phase energy. Errors in wattmeter and energy meter and their compensation and adjustment. Testing and calibration of single-phase energy meter by phantom loading.	8
II	Polyphase Metering - Blondel's Theorem for n-phase, p-wire system. Measurement of power and reactive kVA in 3-phase balanced and unbalanced systems: One-wattmeter, two-wattmeter and three-wattmeter methods. 3-phase induction type energy meter. Instrument Transformers: Construction and operation of current and potential transformers. Ratio and phase angle errors and their minimization. Effect of variation of power factor, secondary burden and frequency on errors. Testing of CTs and PTs. Applications of CTs and PTs for the measurement of current, voltage, power and energy	9
III	Potentiometers: Construction, operation and standardization of DC potentiometers– slide wire and Crompton potentiometers. Use of potentiometer for measurement of resistance and voltmeter and ammeter calibrations. Volt ratio boxes. Construction, operation and standardization of AC potentiometer – in-phase and quadrature potentiometers. Applications of AC potentiometers.	7
IV	Measurement of Resistances - Classification of resistance. Measurement of medium resistances– ammeter and voltmeter method, substitution method, Wheatstone bridge method. Measurement of low resistances – Potentiometer method and Kelvin's double bridge method. Measurement of high resistance: Price's Guard-wire method. Measurement of earth resistance.	7
V	AC Bridges - Generalized treatment of four-arm AC bridges. Sources and detectors. Maxwell's bridge, Hay's bridge and Anderson bridge for self-inductance measurement. Heaviside's bridge for mutual inductance measurement. De Sauty Bridge for capacitance measurement. Wien's bridge for capacitance and frequency measurements. Sources of error in bridge measurements and precautions. Screening of bridge components. Wagner earth device.	9
	TOTAL	40

TEXT BOOK

1. Morris-Electrcal Measurements & Instrumentation , ELSEVIER.(2012)
2. Electronic Instrument And Measurment, Bell, Oxford .(2007)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic Instrumentation, H S Kalsi, TMH	2010
2	Introduction to Measurements And Instrumetation, Arun K. Ghosh, PHI	2012
3	Electrical Measurements And Instrumentation, Gupta & Soni, Genius pub.	2004
4	Electronic Measurements & Instrumentation, Bernard Oliver, John Cage, TMH	2009
5	W.D. Cooper-Electronic Inst. & Measurement Techniques; Prentice Hall, India	1992
6	Elements Of Electronic Instrumentation And Measurement, Carr, Pearson	1996
7	Morris-E Forest K. Harries,“Electrical Measurement”,Willey Eastern Pvt. Ltd.	
8	Electronic Measurements And Instrumentation, Dally, Wiley	2010

4EI4A SENSORS AND TRANSDUCERS

**B.Tech. (EI) 4th sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	TRANSDUCERS - Classification, Performance Characteristics Static & Dynamic, Errors in measurement, Calibration & Standards. Dynamic of Instrument Systems with their representation as zero, First, Second and higher order systems. ROLE OF TRANSDUCERS - Selection Criteria, applications of Transducers	6
II	ACTIVE ELECTRICAL TRANSDUCERS - Thermoelectric Piezoelectric, Hall effect, Magnetostrictive, Ionization Transducers, Diaphragms Pirani gauge.	6
III	PASSIVE ELECTRICAL TRANSDUCERS - Resistive Transducers to measure temp, Strain, Pressure, Moisture, Magnetic Flux, Optical Radiation Inductive Transducers to measure thickness, displacement Capacitive Transducers to Measure thickness, Displacement, Moisture.	9
IV	MECHANICAL TRANSDUCERS - To Measure Temp- bimetallic, Fluid Expansion Pressure: Manometers, Bellows, Bourdon Tube Force: Helical Spring, Load cell, Diaphragm Element. DENSITY: Hydrometer, Air Bubbler, U-tube Weighing System. LIQUID LEVEL: Level to Pressure, Level to Force Based Systems. VISCOSITY: Viscosity to pressure, Viscosity to Torque etc. MOTION: Displacement, Velocity and Acceleration.	10
V	ELECTRONIC DISPLAY - Principal of LED matrix and alpha numeric displays, gas discharged plasma panles, flat panel CRT, LCD, Electro-luminescent and electrophoretic displays.	9
	TOTAL	40

TEXT BOOKS

1. Transducer and Instrumentation DVS Murty PHI Publication. (2004)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic Measurements & Instrumentation, Oliver & Cage, TMH.	1971
2	Instruments Transducers, Neubert, Oxford.	1963
3	Elements of Electronic Instrumentation & Measurements, Joseph J. Carr, Pearson.	2002
4	Fundamentals of Instrumentation and Measurements, Dominique Placko, Wiley.	2013
5	Instrumentation Devices & Systems. Rangan, Sarma & Mani, MVGraw Hill.	1983

4EI5A ANALOG COMMUNICATION

B.Tech. (EI) 4th sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION - Noise effects in Communication System, Resistance Noise, Noise in Reactive Circuits, Noise Figure & Noise Temperature in cascaded Circuits. Basic component of communication systems. Comparison of analog and digital communication.	8
II	AMPLITUDE MODULATION - Need of modulation, Frequency spectrum of AM wave. Power relations. Single side band and vestigial side band techniques. ANGLE MODULATION - Mathematical representation and freq. spectrum of FM and PM, Comparison of AM, FM and PM, Pre-emphasis & D-emphasis.	9
III	DEMODULATION & RADIO RECEIVERS - Basic concepts of AM & FM demodulation, Sensitivity, Selectivity, Image Frequency, Double Spotting, AGC of Receiver, TRF & Superhetrodyne radio receivers, AM & FM Receivers.	8
IV	TRANSMISSION LINE - Types of Transmission line equation, Equivalent circuit, Losses in TL. Reflection & SWR of line with different types of terminations. Distortion less line. Characteristic impedance. Line terminated with any impedance. Voltage and current at any point in a line. Coaxial cables. Measurement of parameter-Attenuation, Reflection Co-efficient and SWR of line.	9
V	BROAD BAND COMMUNICATION & RADAR - Basic concepts & block diagram of satellite communication, fiber optical communication, mobile communication & Radar.	6
	TOTAL	40

TEXT BOOKS

1. Electronic Communication Systems, Kennedy, TMH .(1999)
2. An Introduction Of Analog & Digital Communication, Haykins, Wiley.(2009)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Blake – electronic communication systems,2e, Cengage Learning	2002
2	Communication Systems : Analog And Digital, Singh & Sapre,TMH	2008
3	Taub’s Principles Of Communication Systems, Taub & Schilling,TMH	2008
4	Modern Digital And Analog Communication System, Lathi, Oxford	2010
5	Analog Communication ,Chandrashekhar, Oxford	2006
6	Analog Communication , Hari Bhat, Pearson	2010
7	Digital And Analog Communication System,Leon W. Couch,Pearson	2007
8	Communication Systems, Haykins, Wiley	2013

4EI6A ELECTRICAL TECHNOLOGY

B.Tech. (EI) 4th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	<p>DC MACHINES:</p> <p>DC Generators - Generated voltage, Types of DC generators, No load and load Characteristics, Parallel operation.</p> <p>DC Motors : Production of torque, Back Emf, Torque current and torque speed characteristics, Starting speed control of DC motors, Losses and efficiency</p> <p>DC Servo Motors : Types, Construction, Operation and Applications.</p>	10
II	<p>INDUCTION MOTORS - Construction, Basic principles, Torque slip curves, Effect of rotor resistance cogging, Crawling, Starting, speed control and breaking of induction motors. Losses and efficiency, Single-phase induction motor: Starting methods Stepper Motor: Types, Construction, Operation and Applications .</p>	7
III	<p>SYNCHRONOUS MACHINES - Basic principles starting of synchronous motors, OC and SC, and zero power factor characteristics. Single phase synchronous motor.</p>	8
IV	<p>TRANSMISSION AND DISTRIBUTION SYSTEM - General idea of transmission and distribution system, electrical equipment of a sub station, Interface of power lines with telecommunication circuits. Conductors and insulators for transmission lines.</p>	8
V	<p>PROTECTION - Basic types of faults caused and consequences of faults in power system, over current relay and elementary idea of static relays and their advantages and limitations.</p>	7
	TOTAL	40

TEXT BOOK

1. Stephen J Chapman, Electric Machinery Fundamentals, McGraw-Hill .(2005)
2. P. S. Bimbhra, Electrical Machinery, Khanna Pub. (2003)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electrical & Electronic Technology, Hughes, Pearson	2012
2	Prasad/Sivanagaraju – Electrical engineering, concepts & applications, Cengage learning	2012
3	Basic Electrical Engg., Nagsarkar, Oxford	2005
4	Kothari & Nagrath, Electric Machines, TMH	2004

4EI7A ELECTRICAL ENGINEERING LAB**B.Tech. (EI) 4th Sem.****Max. Marks: 100****3P****Exam: 3 H**

S.No.	Contents
1	Speed control of D.C. Shunt motor by field control method & plot the curve for speed vs field current.
2	Speed control of D.C. Shunt motor by armature control method & plot the curve for speed vs armature voltage.
3	Speed control of a D.C. Motor by Ward Leonard method and to plot the curve for speed vs applied armature voltage.
4	To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit.
5	To perform Star and delta connection on a three phase transformer and find the relation between line and phase voltage and line and phase current.
6	Assemble and disassemble a table fan and a ceiling fan. To learn about their nature of winding, no. of poles and starting capacitor. To draw winding diagram and phasor diagram.
7	To control the speed of single phase induction motor by variable voltage supply
8	To control the speed of single phase induction motor by variable frequency
9	Study different types of wires and assessment of size of conductor and levels and type of insulation.
10	(a) Introduction of various types of wiring accessories. To make the house wiring diagram for a building. To make circuit for staircase wiring.
11	To plot the hysteresis loop of a magnetic material.
12	To study the working of – (i) Starters for DC motors (ii) Star delta starter for AC motors

4EI8A ANALOG ELECTRONICS LAB

B.Tech. (EI) 4th Sem.

Max. Marks: 100

3P

Exam: 3 H

S.No.	Contents
1	Plot gain-frequency characteristics of BJT amplifier with and without feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
2	Study of series and shunt voltage regulators and measurement of line regulation and ripple factor.
3	Plot and study the characteristics of small signal amplifier using FET.
4	Study of push pull amplifier. Measure variation of output power & distortion with load.
5	Study Wein bridge oscillator and observe the effect of variation in R oscillator frequency
6	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7	Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts
8	Design Fabrication and Testing of k-derived filters (LP/HP).
9	Study of a Digital Storage CRO and store a transient on it.
10	To plot the characteristics of UJT and UJT as relaxation.
11	To plot the characteristics of MOSFET and CMOS.

4EI9A MEASUREMENT & INSTRUMENTATION LAB

B.Tech. (EI) 4th Sem.

Max. Marks: 100

2P

Exam: 3 H

S.No.	Contents
1	Measure the low resistance by Kelvin's double bridge
2	Calibrate an ammeter using D.C. slide wire potentiometer.
3	Calibrate a wattmeter using Crompton's potentiometer
4	Measure the power in 3-phase star connected load by two-wattmeter method at different values of load power factor.
5	Calibrate a single-phase energy meter(Analog and Digital) by phantom loading at different power factor by (i) Phase shifting transformer (ii) Auto transformer.
6	Measure earth resistance using fall of potential method
7	Plot the V-I characteristics of a solar panel.
8	Measure low resistance using Crompton's potentiometer
9	Measure unknown inductance using Anderson's bridge.
10	Measure unknown frequency using Wein's Bridge
11	Measure unknown capacitance using DeSauty Bridge.
12	(a) To see the burden effect on the performance of C.T. (b) To measure the phase angle and ratio error of CT.

4E110A HUMANITIES & SOCIAL SCIENCES**B.Tech. (EI) 4th Sem.****Max. Marks: 50****2 P****Exams: 3 H**

S.No.	Contents
1	India- Brief History of Indian Constitution- Framing, Features, Fundamental Rights, Duties.
2	Society- Social groups- Concept & Types, Socialization- Concept & Theory, Social Control- Concept, Social Problem in Contemporary India, Status & Role.
3	Microeconomics- Demand, Supply and Their elasticity's, Cardinal and Ordinal approach to consumption, Consumer Surplus, Laws of returns, Returns to scale, cost analysis
4	Macroeconomics- National Income, Money & Banking, Monetary & Fiscal policies, Unemployment, Inflation, Characteristics of Indian Economy.
5	Introduction to Industrial Psychology – Definitions & Scope Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments. Individual in Workplace: Motivation and Job satisfaction, Stress management, Organizational culture, Leadership & group dynamics.

Textbook:

1. Schiller," Essential of Economics" Mc-Grew Hill, 2013
2. Miner J.B. Industrial/Organizational Psychology. N Y : McGraw Hill.(1992)

References Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kaur – Micro ECON, Cengage learning	2012
2	McEachern/Indra – Macro ECON, Cengage Learning	2012
3	Lipsay "Economics" Oxford Press	2010

5EI1A SIGNALS AND SYSTEMS

B. Tech. (EI) 5th Sem.

Max. Marks: 100

3L + 1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Continuous time and discrete time signals and systems, Properties of systems.	3
	Linear time invariant systems- continuous time and discrete time. Properties of LTI systems and their block diagrams.	5
	Convolution, Discrete time systems described by difference equations.	1
II	Fourier series representation of signals: Fourier series representation of continuous periodic signal & its properties.	3
	Fourier series representation of Discrete periodic signal & its properties.	3
	Continuous time filters & Discrete time filters described by Diff. equation.	2
III	Fourier transform: The continuous time Fourier transform for periodic and non-periodic signals, Properties of CTFT.	4
	Discrete time Fourier transform for periodic and non-periodic signals Properties of DTFT.	4
IV	Z-transform & laplace transform: The region of convergence for the Z-transform. The Inverse Z-transform. Two dimensional Z transform.	3
	Properties of Z transform.	1
	Laplace transform: Properties of Laplace Transform,	2
	Application of Laplace transform to system analysis.	2
V	SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling.	2
	Interpolation technique for the reconstruction of a signal from its samples. Aliasing.	2
	Sampling in freq. domain. Sampling of discrete time signals.	3
	TOTAL	40

TEXT BOOKS

1. Signals And Systems, Oppenheim, Willsky, Nawab, PHI.(1992)
2. Signals And Systems M J Roberts, Mc-Graw Hill.(2004)

REFERENCE BOOKS

S.No.	Name of Authors /Books /Publisher	Publication year
1	Principles Of Linear Systems And Signals, 2e (Intl. Version), Lathi 2nd, Oxford	2002
2	Signal & Systems 3e, Chen 3rd, Oxford	2004
3	Fundamentals Of Signals And Systems, Wiley	2009
4	Signals And Systems, P Rao, Mc-Graw Hill	2011
5	Signals And Systems: A Simplified Approach, Ganesh Rao, 4e, Pearson	2012
6	Signals And Systems: Continuous And Discrete, Roger E Ziemer, 4e, PHI	1998
7	Signals And Systems, Ravi Kumar, PHI	2009
8	Signals & Systems, Iyer, Cengage Learning	2009

5EI2A LINEAR INTEGRATED CIRCUITS

B.Tech. (EI) 5th Sem.

Max. Marks: 100

3L+0T

Exam: 3 Hours

Unit	Contents	Contact Hours
I	OPERATIONAL AMPLIFIERS: Basic differential amplifier analysis, Basic structure and principle of operation, Single ended and double ended configurations, calculation of differential gain, common mode gain, Op-amp configurations with feedback, Op-amp parameters, Inverting and Non-Inverting configuration, Comparators, Adder.	08
II	OPERATIONAL AMPLIFIER APPLICATIONS: Integrator, Differentiator, Voltage to frequency & Frequency to voltage converters. Oscillators: Phase shift, Wien bridge, Quadrature, precision rectifier, half and full wave rectifiers, square wave, triangular wave, sawtooth oscillators. Voltage controlled oscillators.	08
III	ACTIVE FILTERS: Low pass, high pass, band pass and band reject filters, All pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.	08
IV	LINEAR ICs: Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators, A/D and D/A converters, analog switches, The 555 timer as astable and monostable multivibrators. Zero crossing detector, Schmitt trigger and its applications.	08
V	Non-linear Applications of OP-AMP: log and antilog amplifiers, and multipliers. Solution of differential equation and analog computer. PHASE-LOCKED LOOPS: Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM 565 PLL.	08
TOTAL		40

TEXT BOOKS

S.No.	Name of Authors /Books /Publisher	Publication Year
1	OP-AMP and linear integrated circuits 2nd edition, PLHI by Ramakant A. Gayakwad.	1992
2	Integrated Electronics: Analog and Digital circuits & system by Millman & Halkias.	1972

Reference Books:

1. Operational amplifier with linear integrated circuits, 4th edition, W.D. Stanley, Pearson.(2002)
2. Op Amps and Linear Integrated Circuits: Concepts and Applications, Fiore, Cengage learning (2010)
3. Design with operation amplifiers and Analog Integrated circuits by Sergei Franco.(2007)
4. Linear Integrated Circuits by D.R.Chaudhary (WEL). (2007)

5EI3A CONTROL SYSTEM II

B.Tech. (EI) 5th sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Systems in state space: Concept of states and state model, State equation for dynamical system, Relation between transfer function and state equation, modeling of various dynamical systems- electrical, hydraulic, liquid level systems, electrical drives etc.	8
II	Canonical Forms: Non-uniqueness of State equations, Similarity transformations Building blocks of state space model. Controllable Canonical Form. Observable Canonical Form Diagonalization, Significance of Eigen values and Eigenvectors in Control systems, Diagonal form, Jordan Canonical form.	8
III	Solution to state-space Equations: state transition matrix, properties of state transition matrix, computation of state transition matrix. Definition of controllability, Observability, Stabilizability and Detectability, Caley Hamilton's Theorem, State Feedback Control (Pole Placement) , Ackerman's formula, Output Feedback Control.	8
IV	Open Loop Observers for Estimation of States: Closed Loop Observers, Full Order and Reduced Order Observers, Separation Principle, Combined Control Law and Observer.	8
V	Introduction to Discrete time systems: Analogies with Continuous-time systems, Mathematical models for LTI discrete- time systems, Z- transforms, State space modeling of discrete-time dynamical systems. Case Study: Design as an example a complete control system utilizing above concepts.	8
	TOTAL	40

TEXT BOOKS:

1. Modern Control Engineering: Ogata K, Prentice Hall, New Delhi. (2010)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Ogata K, Discrete Time Control Systems PHI Learning	2010
2	Richard Dorf & Robert Bishop, Modern Control Systems, Pearson Education	2011
3	M .Gopal, Control Systems: Principles and Design, Mc Graw Hill Publications	2008
4	Franklin Powell , Feedback Control Of Dynamical Systems, Pearson Education.	2008
5	Singh & Janardhanan - Modern control engineering, Cengage learning	2010
6	Digital Control Systems, George / Kurian, Cengage learning	2011

5EI4A ELECTRONIC MEASUREMENT & INSTRUMENTATION

B.Tech. (EI) 5th sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	SIGNAL GENERATION - Sinewave generators, Frequency synthesized signal generators, Sweep frequency generators.	3
	SIGNAL ANALYSIS: Measurement Technique, Wave Analyzers, Frequency - selective wave analyzer, Heterodyne wave analyzer, Harmonic distortion analyzer, Spectrum analyzer.	5
II	SIGNAL CONVERSION - A/D and D/A converters, comparators, F/V and V/F converters, optical and magnetic isolators, Data Acquisition Systems, Sample and Hold circuits, Sampling theory and its applications in current, voltage, power, energy measurements.	8
III	ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS – Electronic Voltmeter, Electronic Multimeters, Digital Voltmeter, Q meter, Vector Impedance meter, Vector Voltmeter, RF Power & Voltage Measurements, Digital Storage Oscilloscope, Powerscope, Hall Effect transducers.	8
IV	TIME MEASUREMENT TECHNIQUES : Time standards; Measurement of time interval between events, order of events, Vernier technique, Very low time, period, phase, time constant measurements.	3
	FREQUENCY MEASUREMENT TECHNIQUES : Frequency, ratio and product, high and low frequency measurements, Gating error, Time base error, Trigger level error, High frequency measurements.	5
V	INSTRUMENT CALIBRATION & MAINTENANCE- Process instrument calibration, Standards, Laboratories, Validation of standards laboratories, Primary reference standards, traceability, Procedure for calibration of plant instruments and master instruments, Types and procedure of maintenance, Software tools for calibration and maintenance.	5
	TELEMETRY- Meaning and basic scheme of telemetry, Radio telemetry, PWM and digital telemetry schemes.	3
	TOTAL	40

TEXT BOOKS:

1. Electronic Instrumentation And Measurement, Bell, Oxford. 2007
2. Electronic Instrumentation, H S Kalsi, TMH. 2012

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic Measurements And Instrumentation, Lal Kishore, Pearson	2010
2	Elements Of Electronic Instrumentation And Measurement, Carr, Pearson	1996
3	Instrumentation For Engineering Measurements, Dally, Pearson	2003
4	Digital Measurement Techniques, T. S. Rathore, Narosa Publishing House	2003
5	Monographs on System Design using Integrated Circuits, B. S. Sonde, Tata Mc-Graw Hil	1992
6	Digital Signal Processing, D. J. DeFatta, J. G. Lucas and W. , J Wiley and Sons	1987
7	Student reference manual for Electronic and Instrumentation measurement, Wolf &Smith, PHI Publication	2003
8	Principles of measurement and instrumentation , Alan Morris, PHI	1989
9	Industrial instruments and control, S.K.Singh , TMH	2008
10	Instrumentation Devices and Systems, Rangan C. S., Sarma G. R. and Mani V. S. V., Tata McGraw-Hill Publishing Company Limited.	1997
11	Measurement Systems, Doebelin E. O. and Manik D. N., Tata McGraw-Hill Publishing Company Limited	1959
12	Process Control Instrumentation Technology, Johnson C. D., Prentice Hall of India Private Limited	2010
13	Applied Instrumentation, W. G. Andrews- Vol II Applied Instrumentation, W. G. Andrews- Vol III	1982
14	Principles of Industrial Instrumentation and Control Systems, Cengage learning	2011

5EI5A MICROPROCESSORS

B.Tech. (EI) 5th sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

Unit	Contents	Contact Hours
1	The 8085 architecture, memory, I/O Devices, Logic devices for Interfacing, memory, Interfacing, addressing modes, Instructions, programming techniques.	8
2	Additional data transfer & 16 bit arithmetic Instructions, arithmetic operations related to memory counter and time delays, stacks & subroutines, conditional call and return instructions.	8
3	Interrupts: The 8085 Interrupt, vectored interrupts, additional I/O concepts and processes, serial I/O & data communication.	8
4	General purpose programming peripheral devices: 8255 Programmable peripheral interface, Interfacing keyboard and Seven Segment display. The 8254 programmable Interval timer, the 8259 programmable Interrupt controller.8257 DMA controller	8
5	Introduction to 8086, 80286, Pentium processors: The 8086 family overview, architecture, memory segmentation, multiuser/multitasking operating system concepts, scheduling, accessing resources, memory management.	8
	Total	40

TEXT BOOKS:

1. Microprocessors Architecture, Programming & Application, Ramesh S. Gaonkar, (2000)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1.	The 8086 Family John Uffenbeck Pearson Edu.	2002
2.	The Intel Family of Microprocessors: Hardware and Software Principles and Applications w/CD, Antonakos, Cengage learning	2001
3.	The 8086 Microprocessor: Programming & Interfacing the PC w/CD, Ayala ,Cengage learning	2003
4.	Microprocessors and Interfacing –Douglas V’ Hall Tata McGraw Hill.	1974
5.	Advanced Microprocessors & Peripherals A K Ray & KM Bhurchandi.	2006

5EI6.1A OPTIMIZATION TECHNIQUES

B.Tech. (EI) 5th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	LINEAR PROGRAMMING Problem (LPP) – Introduction and Engineering Applications of Optimization, LPP Formulation, Geo- Metrical aspects of LPP, Graphical Solution. Linear Programming in Standard Form, Simplex, Big -M and Two Phase Methods, Special Cases of LP. Duality theory, Dual Simplex Method	12
II	Application of LPP- Revised Simplex Method, Transportation, Assignment and Traveling Salesman Problem.	7
III	PROJECT SCHEDULING (PS) – Project Scheduling by PERT and CPM. Network Analysis.	6
IV	Non Linear Programming Problem (NLPP): Unconstrained Optimization Techniques, Direct Search Methods, Descent methods, Constrained Optimization, Direct and Indirect Methods, Acquaintance to Optimization Softwares like TORA	13
V	DYNAMIC PROGRAMMING (DP) – Introduction, Principles of Optimality, Formulation and Solution of DP Problems. Applications to Transportation Problems and LPP.	12
	TOTAL	40

TEXT BOOKS

1. Hamdy A. Taha, Operations Research: An Introduction, Eighth edition, PHI, New Delhi (2008).
2. S. Chandra, Jayadeva, Aparna Mehra, Numerical Optimization with Applications, Narosa Publishing House (2013)

REFERENCE BOOKS

SNo	Name of Authors /Books /Publisher	Year of Publication
1	Ravindran, Phillips, Solberg, Operation Research, John Wiley and Sons, New York	2005
2	S S. Rao , Optimization: Theory and Applications	1984
3	Optimization Techniques by Dr. Gokhroo & Others	2013
4	Hiller and Lieberman, Introduction to Operation Research (Seventh Edition) Tata McGrawHill Publishing Company Ltd	2012
5	D. G. Luenberger, Linear and Nonlinear Programming, 2nd Edition, Kluwer, 2003. S. A. Zenios (editor)	2003
6	Financial Optimization, Cambridge University Press (2002).	2002
7	M. S. Bazaraa, J. J. Jarvis and H. D. Sherali, Linear Programming and Network Flows, 3rd Edition, Wiley	2011
8	J. C. Pant, Introduction to Optimization, Jain Brothers, New Delhi	2012
9	Data Analysis, Optimization and Simulation Modeling, w/CD , Albright, Cengage learning	2009

5EI6.2A COMPUTER ORIENTED NUMERICAL & STATISTICAL METHODS**B.Tech. (EI) 5th Sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	SOLUTION OF LINEAR EQUATIONS- Cramer's Rule, Gauss Elimination, Gauss Jordan Elimination and Gauss Seidal Iterative Methods and their Computer Programming in C. Matrix Inversion by Gauss Elimination, Computer Programs for Matrix Inversion.	8
II	SOLUTION OF NON-LINEAR EQUATIONS- Interval Bisection Method, Secant Method, Regula- Falsi Method, Curve Fitting, Method of Least Squares and their Computer Programming in C	7
III	SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS- Solution of Partial Differential Equations with Special Reference to Heat Equation, Laplace Equation and Wave Equation Milne's and their Computer Programming in C. Curve Fitting Methods – Method of Least Squares, Fitting a Straight Line, Parabola..	9
IV	STOCHASTIC PROCESSES - Definitions, Random Process Concept, Statistics of Stochastic Processes: Mean, Autocorrelation, Autocovariance. Stationary Processes, Strict and Wide Sense Stationary, Random Processes and Linear Systems.	9
V	STOCHASTIC PROCESSES IN FREQUENCY DOMAIN - Power Spectrum of Stochastic Processes, Transmission over LTI systems, Gaussian and White Processes, Properties of Power Spectral Density	7
	TOTAL	40

TEXT BOOKS:

1. Numerical methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain. (2003)
2. Computer based numerical algorithms by E.V. Krishnamoorthy.(2004)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Introduction to Numerical Analysis by E. Atkinson	1984
2	Peebles, P. Probability, random variables and random signal principles. Mc Graw Hill.	2007
3	Computer Oriented Numerical & Statistical Methods by Dr. Gokhroo & Others	2012
4	Elementary Numerical Analysis by Samuel D.Conte and Cart de Boor, McGraw Hill International Edition.	19100
5	Numerical methods for Science and Engineering, PHI by R.G.Stanton	1963
6	Papoulis, A. Probability, random variables and stochastic processes. Mc Graw Hill (international Students' edition), Singapore.	2012
7	Childers, D. G. Probability and random processes using MATLAB. Mc Graw Hill,	1997
8	Smith, G. D. Numerical Solution of PDE, Oxford Uni. Press	2002
9	Numerical Analysis, Burden, Cengage learning	2004
10	Numerical Mathematics and Computing , Cheney , Cengage learning	2005

5EI6.3A DIGITAL COMMUNICATION

B.Tech. (EI) 5th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Digital Transmission Of Analog Signals: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Error probability in PCM system.	8
II	Base Band Transmission: Line coding(RZ, NRZ): Polar, Bipolar, Manchester, AMI. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum. Optimum transmit and receive filters. Matched filter detection.	8
III	Digital Modulation Techniques: Geometric interpretation of signals and Orthogonalization. ASK, BPSK, BFSK, QPSK, M-ary PSK, MSK and GMSK modulation techniques and Coherent detection of these techniques. Signal constellation and calculation of error probabilities.	8
IV	Information Theory: Measure of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound, Capacity of a Gaussian Channel, BW-S/N trade off.	8
V	Source & Error Control Coding: Coding and decoding of Information Source coding, Entropy coding, Hamming code, Single Parity- Bit Code, Linear Block code, Cyclic code & Convolutional code.	8
	TOTAL	40

TEXT BOOKS:

1. Lathi, Modern Digital And Analog Communication Systems, Oxford Publication.(2002)
2. Taub & Schilling, Principles Of Communication Systems, , TMH.

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Simon Haykin, An Introduction To Analog & Digital Communication System, Wiley	2013
2	Hwei Hsu, Schaums Outline Analog And Digital Communication, TMH	2006
3	Kennedy, Electronic Communication Systems, TMH.	2013
4	K.Sam Shanmugam, Digital & Analog Communication Systems, Wiley	2012
5	Sklar, Digital Communication, Pearson Education.	2010
6	J.G.Proakis, Digital Communication, McGraw –Hill.	2004
7	Simon Haykin, Digital Communications, Wiley.	2008
8	Ranjan Bose, Information Theory & Coding, TMH.	2011

5EI7A COMPUTER PROGRAMMING LAB-II

B.Tech. (EI) 5th sem.
2P

Max. Marks: 75
Exam Hours: 3

S.No	Content	Hours
1.	Programs in C++	15
(i)	Palindrome Number. Also Generate prime numbers between 1 & given number.	3
(ii)	Pyramid of stars using nested for loops. Also Reversed pyramid using for loops & decrement operator.	3
(iii)	Write a program to find sum of all integers greater than 100 and less than 200 that are divisible by 7.	3
(iv)	Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, Test of symmetry).	3
(v)	To implement tower of Hanoi problem. Also Implement morse code to text conversion and vice-versa.	3
2.	Program in Java	18
(i)	Write a program to display a greet message according to Marks obtained by student	3
(ii)	Write a program to generate 5 Random nos. between 1 to 100, and it should not follow with decimal point.	3
(iii)	Write a program to convert given no. of days into months and days. (Assume that each month is of 30 days)	3
(iv)	Write a program to find average of consecutive N Odd numbers and even numbers.	3
(v)	Write a program to Display Invert Triangle using while loop	3
(vi)	Implement spell checker using dictionary	3

5EI8A CONTROL LAB

B.Tech. (EI) 5th sem.
2P

Max. Marks: 75
Exam Hours: 3

S.No.	Contents
1	To design I order system on R-C circuit and observe its response with the following inputs and trace the curve. (a) Step (b) Ramp (c) Impulse
2	To design II order electrical network and study its transient response for step input and following cases:- (a) Under damped System (b) Over damped System (c) Critically damped System
3	To Study the frequency response of following compensating networks, plot the graph and find out corner frequencies:- (a) Lag Network (b) Lead Network (c) Lag-lead Network
4	To perform experiment on stepper motor (finding step angle and frequency response etc.)
5	To perform experiment on Potentiometer error detector.
6	To perform experiments on Position control system using dc servomotor.
7	(a)To draw the error Vs angle characteristics of Synchro transmitter. (b)To draw the characteristics of Synchro transmitter and control transformer.
8	To perform experiments on relay control system.
9	(a). To find Transfer Function of a.c. servo motor. (b). To draw Torque Speed Characteristics of a.c. servo motor.
10	(a). To find Transfer Function of d.c. servo motor. (b). To draw Torque Speed Characteristics of armature controlled d.c. servo motor.
11	To identify a system T.F. using its frequency response.
12	To perform experiments on magnetic levitation systems.

5EI9A MICROPROCESSOR LAB**B.Tech. (EI) 5th sem.
2P****Max. Marks: 75
Exam Hours: 3**

S.No.	Contents
	Following exercises are to be done in 8085 assembly language.
1	Arranging a set of data in Ascending order.
2	Arranging a set of data in Descending order.
3	Finding out number of Positive, Negative and Zeros from a Data Set.
4	Searching the Existence of a certain data in a given data.
5	BCD to Binary conversion.
6	Binary to BCD conversion
7	Design a Up/Down Counter
8	Multiply Two 8 Bit Numbers using Successive Addition and Shifting method.
9	Find Factorial of a number.
10	Solve the given Algebraic Equation
11	Generate a Software Delay.
12	Division of 8 bit Unsigned Numbers.
13	A program to display real time clock. Assume a periodic signal is interrupting RST 7.5 signal after every 0.5 seconds,
14	Generate a square wave and rectangular wave of given frequency at the Output pin of 8255 chip.

5EI10A TRANSDUCER LAB

B.Tech. (EI) 5th sem.
2P

Max. Marks:75
Exam Hours:3

S.No.	CONTENTS
1.	To draw the characteristics of following temperature transducers :- (a) PT 100 (b) Thermistor (c) K Type Thermocouple
2.	To perform experiment on ultrasonic depth meter.
3.	Water level measurement kit: (a) To draw I/P vs O/P characteristics. (b) Study of water level indication. (c) To plot the curve between error and different measured water level.
4.	Load Cell Kit: (a) To perform experiment and plot curve between load and strain. (b) To study about excitation. (c) To plot error curve at different loads.
5.	To study Piezo electric vibration pickup
6.	LVDT kit: (a) To study excitation and balancing network. (b) To study phase difference. (c) To plot curve between displacement and output voltage.
7.	Torque measurement kit: (a) To study about unbalanced strain. (b) To plot the curve between torque vs strain.
8.	To draw characteristics of LDR.
9.	To draw Characteristics of Hall effect sensor.
10.	Design of Opto-coupler using photoelectric transducers.
11.	To draw Characteristics of Micro pressure and Micro accelerometer sensing device.
12.	Measurement of displacement and proximity using proximity sensors.
13.	To study various pressure sensors like Bourdon tube, Diaphragms, Pressure switches, Bellows etc.

5EI11A PERSONALITY DEVELOPMENT AND GENERAL APTITUDE

B.Tech. (EIC) 5th sem.
2P

Max. Marks: 50
Exam Hours: 3

S.No.	CONTENTS
PURPOSE	
<ol style="list-style-type: none">1. To make students appreciate the notion and components of personality, thereby to apply the acquired information to themselves and to march towards brilliance in their respective academic and professional careers.2. To enable students to keep themselves abreast of general knowledge and current affairs.3. To bring out creativity and other latent talents with right goal setting so that self- esteem gets enhanced.4. To sharpen memory skills and other study skills vital for academic and professional excellence.5. To give training for positive thinking to keep the students in a good stead at the time of crisis.	
1.	<p style="text-align: center;">Introduction</p> <ul style="list-style-type: none">• Meaning of Personality• Determinants of Personality- biological, psychological and socio- cultural factors.• Misconceptions and clarifications• Need for personality development
2.	<p style="text-align: center;">Self-Awareness and Self Motivation</p> <ul style="list-style-type: none">• Self analysis through SWOT and Johari window• Elements of motivation• Seven rules of motivation• Techniques and strategies for self motivation• Motivation checklist and Goal setting based on principle of SMART• Self motivation and life• Importance of self-esteem.
3.	<p style="text-align: center;">Memory and study skills</p> <ul style="list-style-type: none">• Definition and importance of memory• Causes of forgetting• How to forget (thought stopping), how to remember (techniques for improving memory)• The technique of passing exams-management of examination fear.
4.	<p style="text-align: center;">Power of positive thinking</p> <ul style="list-style-type: none">• Nurturing creativity, decision-making and problem solving.• Thinking power- seven steps for dealing with doubt• Traits of positive thinkers and high achievers

	<ul style="list-style-type: none"> • Goals and techniques for positive thinking • Enhancement of concentration through positive thinking • Practicing a positive life style.
5.	<p>General Knowledge and Current Affairs</p> <ul style="list-style-type: none"> • Regional, national and international events • Geographical, political and historical facts • Information on sports and other recreational activities • Basic knowledge with regard to health and health promotion
<p>PRACTICAL TRAINING</p> <p>The course would include the following practical exercises. Ice-breaking. Brainstorming and simulation exercises. Thought stopping. Memory and study skills training</p>	

TEXTBOOKS:

1. Hurlock, E.B, Personality Development, 28th Reprint. New Delhi: Tata Mc Graw Hill. (2006).
2. Mikew, Martin, schinzinger, Ethics in engineering, TMH. (2010)

REFERENCES BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Mile, D.J., Power of positive thinking. Delhi: Rohan Book Company.	2004
2	Pravesh Kumar, All about self- Motivation. New Delhi: Goodwill Publishing House.	2005
3	Dudley, G.A. ,Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.	2004
4	Lorayne, H. ,How to develop a super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd	2004
5	Personal Development for Life and Work, Wallace, Cengage Learning	2013
6	Soft Skills for Everyone w/CD, Butterfield, Cengage Learning	2013

6EI1A PROCESS CONTROL SYSTEM

B.Tech. (EI) 6th sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	GENERAL CONCEPTS: General Concepts and terminology, Piping and Instrumentation diagram	4
	TYPES OF DYNAMIC PROCESS: Instantaneous, Integral, First and second order, self regulating, interacting and non interacting processes. Dead time elements	3
II	MATHEMATICAL MODELING OF SYSTEMS: Liquid Systems (Level and flow), perturbation variable and linearization methods.	4
	Response of a thermometer bulb, Concentration response of a stirred tank. Temperature response of a stirred tank, Process lag, load disturbance and their effect on processes.	5
III	BASIC CONTROL ACTION: Basic control action, two position, multi position ,continuous controller modes: proportional , integral and Derivative ,Composite Controller modes PI,PD,PID ,Integral wind up and anti wind up.	4
	Response of controllers for different test Input .Selection of control modes for processes like level, temperature and flow.	3
IV	CONTROLLER TUNING METHODS: Evaluation criteria IAE, ISE ,ITAE etc. process reaction curve method, continuous oscillation method, damped oscillation method, auto tuning.	4
	FINAL CONTROL ELEMENTS: Pneumatic control valve, construction details and types, valve sizing, selection of control valves, Inherent and Installed characteristics valve actuators and positioners.	4
V	ADVANCED CONTROL SYSTEM: Cascade control, ratio control, feed forward control. Over-ride, split range and selective control. Multivariable process control, Interaction of control loops.	3
	CASE STUDY: Distillation column, Basic features of composition control schemes. Control of overhead composition, Bottom composition and both product compositions, Location of sensing element, Control of columns with varying feed rates, Pressure control, Control of feed temperature and internal reflux control, boiler drum level control.	6
	TOTAL	40

TEXT BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Peter Harriott, " <i>Process Control</i> ", Tata McGraw Hill, New Delhi,	1985
2	Surekha Bhanot "Process control principals and applications", Oxford University press .	2007

REFERENCES BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Principles of Industrial Instrumentation and Control Systems, Alavala, Cengage Learning.	2004
2	Process dynamics and Control, Sundaram, Cengage Learning	2005

6EI2A FIBER OPTICS & INSTRUMENTATION

B.Tech. (EI) 6th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

Unit	Contents	Contact Hours
1	OPTICAL FIBER OVERVIEW- Introduction, Ray theory, Optical fibers: multimode, single mode, step index, graded index, plastic & glass fibers. Transmission Characteristics of Optical Fibers - Introduction, Attenuation, Material absorption loss, Fiber bend loss, scattering, Dispersion (intermodal & intramodal), Dispersion Shifted Fibers, Dispersion Compensating Fibers. Manufacturing of optical Fibers – preparation of optical fiber, Liquid phase techniques, Vapour phase depositions techniques.	8
2	OPTICAL FIBER SOURCES- Laser- Emission and absorption of radiation, Einstein relation, Absorption of radiation, Population inversion, Optical feedback, Threshold condition. Population inversion and threshold, working of three levels & four level laser. Basic idea of solid state, semiconductors, gas & liquid laser. Basic concept of Q-switching and mode locking. Light Emitting Diode - Structure, Material, Characteristics, Power & Efficiency.	8
3	OPTICAL DETECTORS & CONNECTION - Optical detection principles, quantum efficiency, Responsivity, PIN photo diode, Avalanche photo diodes, Noise in Detectors, Photo Diode Materials. Fiber Alignment, fiber splices, fiber connectors, expanded beam connectors, fiber couplers.	8
4	OPTICAL FIBER MEASUREMENTS - Measurements of Fiber Attenuation, Dispersion, Refractive Index Profile, Cut off Wave Length, Numerical Aperture & Diameter. Field measurement through optical time domain reflectometry (OTDR), Laser based systems for measurement of distance, Velocity, Holography.	8
5	OPTICAL FIBER APPLICATIONS – Wavelength division multiplexing, DWDM, active and passive components, optical sensors, optical amplifiers, public network applications, military, civil and industrial applications.	8
	Total	40

TEXT Books:

1. J.M. Senior, Optical Fiber Communication: Principles and Practice, Pearson Education. (2013)
2. R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications. (2014)

REFERENCE Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications.	2004
2	J.Gowar, Optical Communication Systems, PHI.	1999
3	A.Ghatak & K.Thygarajan, Introduction to Fiber Optics, Cambridge University Press.	2006
4	Joseph C Palais, Fiber Optics Communication, PHI.	2010
5	Harold Kolimbris, Fiber Optics Communication, Pearson Education.	2009
6	D. Anuradha, Optical Fiber and Laser, Principles and Applications, New Age.	2008

6EI3A INDUSTRIAL MEASUREMENTS**B.Tech. (EI) 6th Sem.
3L+0T****Max. Marks : 100
Exam Hours: 3**

Unit	Contents	Contact Hours
1	TEMPERATURE MEASUREMENTS - Thermocouples, Resistance Temperature detectors: 2-wire, 3-wire systems, Thermistors, Radiation and optical pyrometers, Infrared pyrometers, Calibration of temperature sensors. RECORDER- Operating mechanism, Chart drive mechanism, Strip chart recorders, Circular chart recorders, X-Y type recorders, Magnetic tape recorders.	8
2	PRESSURE MEASUREMENTS - Electric pressure transducers: LVDT, strain gauge, Capacitive pressure transducers, Piezo electric pressure transducers, Potentiometric pressure transducer, Low pressure measurement: McLeod gauge, Thermal conductivity: Thermocouple type, Differential pressure transmitters, Calibration of pressure gauge: Dead weight tester.	8
3	FLOW MEASUREMENTS - Orifice, Venturi, Flow nozzles and pitot tubes, Rotameters, Vortex flowmeters, Electromagnetic flow meters, Ultrasonic flow meter, thermal flow meter, Mass flow type meters, Shunt flow meters.	8
4	LEVEL MEASUREMENTS - Float gauge, Bubbler (Purge) system, Hydrostatic pressure type in open vessels and closed vessels, Differential pressure method, Electrical conductivity method, Capacitance type, Radioactive type, Ultrasonic type. DENSITY MEASUREMENTS - Ultrasonic densitometer, radiation densitometer, Impulse wheel methods.	8
5	STRAIN MEASUREMENTS - Electrical strain gauges Wire & foil type materials, Adhesives configuration, Protective coatings, Bonding, Temp. compensation, Calibration, Applications Rosette gauges.	8
	Total	40

Text Books:

1. Industrial Instrumentation ,S K Singh,New Age.(2003)

Reference Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Transducer and Instrumentation DVS Murty PHI Publication.	2004
2	Electronic Measurements & Instrumentation, Oliver & Cage, TMH.	1971
3	Instruments Transducers, Neubert, Oxford.	1986
4	Elements of Electronic Instrumentation & Measurements, Joseph J. Carr, Pearson.	2002
5	Fundamentals of Instrumentation and Measurements, Dominique Placko, Wiley.	2013
6	Instrumentation Devices & Systems. Rangan, Sarma & Mani, MVGraw Hill.	1997
7	Industrial Instrumentation ,Krishnaswamy .K.,New Age.	2005

6EI4A BIOMEDICAL INSTRUMENTATION

B.Tech. (EI) 6th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	HUMAN BODY SUBSYSTEMS- Brief description of neural, muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities.	3
	TRANSDUCERS AND ELECTRODES- Principles and classification of transducers for Bio-medical applications, Electrode theory, different types of electrodes, Selection criteria for transducers and electrodes.	3
II	BIOPOTENTIALS- Electrical activity of excitable cells, ENG, EMG, ECG, ERG, ECG. Neuron potential.	2
	CARDIOVASCULAR SYSTEM MEASUREMENTS- Measurement of blood pressure, blood flow, cardiac output, cardiac rate, heart sounds, Electrocardiograph, phonocardiograph, Plethysmograph, Echocardiograph.	5
III	INSTRUMENTATION FOR CLINICAL LABORATORY- Measurement of pH value of blood, ESR measurement, hemoglobin measurement, O ₂ and CO ₂ concentration in blood, GSR measurement. Spectrophotometry, chromatography, Hematology,	4
	MEDICAL IMAGING: Diagnostic X-rays, CAT, MRI, thermography, ultrasonography, medical use of isotopes, endoscopy.	4
IV	PATIENT CARE, BIOTELEMETRY AND SAFETY MEASURES Elements of Intensive care monitoring basic hospital systems and components, physiological effects of electric current shock hazards from electrical equipment, safety measures, Standards & practices. Biomedical Telemetry: Introduction, block diagram and description of single channel/multi channel telemetry systems.	7
	THERAPEUTIC AND PROSTHETIC DEVICES - Introduction to cardiac pacemakers, defibrillators, ventilators, muscle stimulators, diathermy, heart lung machine, Hemodialysis, Applications of Laser.	5
V	APPLICATIONS OF BIOPOTENTIALS: Electrocardiographic diagnostic criteria for Identification of cardiac disorders, Electrocardiographic pattern of ischemia, Atrial abnormalities, Ventricular enlargement, Abnormal ECG patterns, Clinical applications of EEG, EMG, ERG	4
	COMPUTER APPLICATIONS: data acquisition and processing, remote data recording and management. Real time computer applications	3
	TOTAL	40

TEXT BOOKs:

1. L. Cromwell, F. J. Weibell, and L. A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson Education, Delhi, (1990)
2. J. J. Carr and J. M. Brown, Introduction to Biomedical Equipment Technology, 4th ed., Pearson Education, Delhi, (2001)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Biomedical Instrumentation Systems , Chatterjee, Cengage learning	2011
2	Aston, "Principles of Biomedical Instrumentation and measurements", McGraw Hill publishing Co,	1990
3	L.A. Geddes and L.E. Baker, Principles of Applied Biomedical Instrumentation , John Wiley & Sons, Inc,	1989
4	Richard Aston, Principles of Biomedical Instrumentation and Measurement , Merrill Publishing Company,.	1990
5	Jacobson B. and Webster J.G., Medical Clinical Engineers , Prentice Hall Inc.,.	1979
6	J. G. Webster, Medical Instrumentation Application and Design, 3rd ed., John Wiley & Sons, N.Y.,	1998
7	R. S. Khandpur, Handbook of Biomedical Instrumentation, 2nd ed., Tata McGraw Hill,	2003
8	R. Anandanatarajan, "Biomedical Instrumentation", PHI Learning,	2009

6EI5A MICROCONTROLLERS & EMBEDDED SYSTEMS**B.Tech. (EI) 6th sem.
3L+1T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONT CT HOURS
I	THE 8051 MICROCONTROLLER: Introduction, The 8051 microcontroller hardware, I/O pins, Ports, External memory, Counters and Timers, Serial data.	8
II	8051 ASSEMBLY LANGUAGE PROGRAMMING: Addressing modes, External data moves, Stack, Push and Pop opcodes, Logical operations, Byte level and bit level logical operations. Arithmetic operations, Jump and call instructions, Interrupts & returns.	8
III	REAL TIME CONTROL: Interrupts, Multiple sources of interrupts, Non maskable sources of interrupts, Interrupt structure in 10051, Timers, Free running counter & Real Time control.	8
IV	SYSTEM DESIGN: Serial I/O interface, Parallel I/O ports interface, Digital and Analog interfacing methods, LED array, keyboard, Printer, Flash memory interfacing.	8
V	INTRODUCTION TO EMBEDDED SYSTEM: Application of Microcontrollers in interfacing, MCU based measuring instruments. Real Time Operating System for System Design, Multitasking System, Task Definition in a Multitasking System, Round Robin Scheduling, Full Preemptive Scheduling, Basic study and Features of Commercial RTOS : WINCE and Embedded Linux.	8
	TOTAL	40

TEXT BOOKS:

1. Kenneth J.Ayala, "*The 8051 Micro controller*", Penram Interfacing Publishing, (1996)

REFERENCE BOOKa:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Myke Predko, "Programming and Customizing the 8051 micro controller", Tata-McGraw Hill, 3rd reprint.	2002
2	Rajkamal, "Embedded Systems" TMH	2004
3	The 8051 Microcontrollers & Embedded Systems,Mazidi, ,PHI	2004
4	David E. Simon, "An Embedded Software Primer", Pearson Education	1999
5	The 8051 Microcontroller w/CD, Ayala, Cengage learning	1999
6	The 8051 Microcontroller & Embedded Systems using Assembly and C w/CD, Ayala /Gadre, Cengage learning	2007
7	Embedded Systems & Robots: Projects Using the 8051 Microcontroller, Ghoshal, Cengage learning	2011

6EI6.1A CONTROL SYSTEM COMPONENTS

**B.Tech. (EI) 6th sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Industrial Control Devices: Switches - construction , symbolic representation , working, applications of toggle switch, DIP switch , Rotary switch, Thumbwheel switch , selector switch , Push button , Drum switch , Limit switch , Temperature switch , Pressure switch , Level switch ,Flow switch.	6
	Relays - construction, working, specifications/selection criteria and applications of electromechanical relays, reed relay, hermetically sealed relay, solid state relay. Contactors - construction, working, specification and application of contactors, comparison between relay & contactor.	4
II	Pneumatic and Hydraulic components: Pneumatic - pneumatic power supply and its components, pneumatic relays (bleed and non bleed, reverse and direct) , single acting and double acting cylinders , special cylinders (cushion , double rod , tandem, multiple position, rotary), filter regulator lubricator, pneumatic valves (direction controlled valves , flow control etc.), special type of valves , time delay valves, air motors. Pneumatic circuits- standard symbols used for pneumatic circuits, sequence diagrams, different pneumatic circuits: Reciprocating, sequencing, block transfer etc.	4
	Hydraulic: hydraulic supply, hydraulic pumps, hydraulic actuators (cylinder and motor), valves. Hydraulic circuits – standard symbol used for hydraulic circuits, different hydraulic circuits- Meter in , Meter out, Reciprocating , speed control , sequencing of cylinder , direction control etc.	4
III	Electrical Drives: Direct current motors: theory of operation , Wound Field DC motors- series wound, shunt wound compound motors ,Permanent magnet motors – relationship between torque and speed, circuit model of pm motor.	2
	DC motor control circuits- DC motor control using analog drive , reversing the PM motor, DC motor control using pulse-width modulation, PWM control circuits, DC motor control for larger motors, Breaking the Dc motor, Application using a small DC motor, Brushless DC motors.	3
IV	Alternating current motors: AC power, Induction motors- theory of	4

	operation, single phase motor, three phase motor, split phase motor, AC servomotors.	
	Synchronous motors -theory of operation, power factor correction, small synchronous motor, Universal motors, AC motor control- start up control, jogging, reduced voltage starting, variable speed control of AC motors, variable frequency drives, vector drives.	3
	Stepper motor: permanent magnet stepper motors, variable reluctance stepper motors, hybrid stepper motors , stepper motor control circuits-controlling the two phase and four phase stepper motor, micro stepping, improving torque at higher stepping rates , stepper motor application.	4
V	Relay logic and Programmable logic controllers :Relay logic control: relay logic, ladder diagram, timer , counters and sequencer, Programmable logic controller: introduction, PLC hardware, setup procedure, operation, Programming the PLC : ladder diagram programming, bit instructions , timers, counters, sequencer, advanced instructions, programmable logic controllers and Networks. Motion control.	6
	TOTAL	40

TEXT BOOKS:

1. Modern Control Technology , Components and Systems ,Christopher T. Kilian Cengage Learning.(2006)
2. Industrial Electronics , Petruzella Mc Graw Hill.(1996)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Pneumatics , Festo Didactic	2005
2	Hydraulics , Festo Didactic	1990
3	Process Control , Principles and Applications , Surekha bhanot	2007
4	Process control and instrumentation technology , CD Johnson, TMH	2009
5	Process instruments and controls Handbook , Douglas M. Considine, McGraw-Hill	1999

6EI 6.2A ROBOTICS**B.Tech. (EI) 6th sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION- Introduction: Basic concepts, definition and origin of robotics, different types of robots, robot classification, applications, robot specifications	6
II	INTRODUCTION TO AUTOMATION – Components and subsystems, basic building block of automation, manipulator arms, wrists and end-effectors. Transmission elements: Hydraulic, pneumatic and electric drives. Gears, sensors, materials, user interface, machine vision, implications for robot design, controllers.	10
III	KINEMATICS, DYNAMICS AND CONTROL- Object location, three dimensional transformation matrices, inverse transformation, kinematics and path planning, Jacobian work envelope, manipulator dynamics, dynamic stabilization, position control and force control, present industrial robot control schemes.	10
IV	ROBOT PROGRAMMING- Robot programming languages and systems, levels of programming robots, problems peculiar to robot programming, control of industrial robots using PLCs.	7
V	AUTOMATION AND ROBOTS- Case studies, multiple robots, machine interface, robots in manufacturing and non-manufacturing applications, robot cell design, selection of a robot.	7
	TOTAL	40

TEXT BOOKS:

1. Spong and Vidyasagar, “**Robot Dynamics and Control**”, John Wiley & Sons, (1990)
2. Asfahl C.R, “**Robots and Manufacturing Automation**”, John Wiley & Sons, New York, (1992)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Klafter R.P, Chmiclewski T.A, Negin M, “Robotics Engineering: Integrated approach”, Prentice Hall, New Jersey.	1994
2	Y. Koren -Robotics for Engineers McGraw Hill	1983
3	Mikell P, Weiss G.M, Nagel R.N and Odrey N.G, “Industrial Robotics”, McGraw Hill, New York.	1986
4	Deb S.R, “ <i>Robotics Technology and Flexible Automation</i> ”, Tata McGraw Hill, New Jersey	1992
5	Asfahl -Robots & Manufacturing Automation Wiley Eastern	1998
6	Richard D. Klafter -Robotic Engineering, , Prentice Hall	1989
7	Asada and Slow time -Robot Analysis and Intelligence, , Wiley Inter-Science.	1992
8	John J Craig -Introduction to Robotics, , Pearson Edu.	2005
9	Mark W. Spong and M. Vidyasagar -Robot Dynamics & Control –, John Wiley & Sons	2003

6EI6.3A RANDOM VARIABLES & STOCHASTIC PROCESSES

B.Tech. (EI) 6th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	PROBABILITY - Introduction, definitions, conditional probability, combined experiments.	7
II	RANDOM VARIABLES - Introduction, Distribution and density functions, Discrete and continuous random variables, (Gaussian), Exponential, Rayleigh, Uniform, Bernoulli, Binominal, Poisson, discrete Uniform and conditional distributions. Functions of one random variable: distribution, mean, variance, moments and characteristics functions.	8
III	MULTIPLE RANDOM VARIABLES -distributions, Pnc function of two random variables, Two functions of two random variables, Joint moments, Joint characteristics functions, Conditional distributions, conditional expected values, statistical independence. Multiple random variables: multiple functions of multiple random variables, jointly Gaussian random variables, sums of random variable, Central limit theorem.	9
IV	STOCHASTIC PROCESSES - Definitions, Random process concept, Statistics of stochastic processes: mean, autocorrelation, strict and wide sense stationary, random processes and Linear Systems.	7
V	STOCHASTIC PROCESSES IN FREQUENCY DOMAIN - Power spectrum of stochastic processes, Transmission over LTI systems, Gaussian and White processes, Properties of power spectral density.	9
	TOTAL	40

TEXT BOOKS:

1. Probability, Random Variables And Random Signal Principles, Peebles, TMH.(2002)
2. Probability, Statistics And Random Processes, Veerarajan, TMH,(2002)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Probability, Random Variables And Random Processes, Schum's Outlines, TMH	2008
2	Digital Telephony, Bellamy, Wiley	2006
3	Schaum's Outline of Theory and Problems of Transmission Lines, TMH	1968
4	Probability, Random Variables And Stochastic Processes, Papoulis, TMH	2002
5	Probability & Statistics In Engg., Hines, Wiley	2003
6	An Introduction To Probability Theory & Its App., Feller, Wiley	2008
7	Probability and Statistics for Engineering and the Sciences , Devore, Cengage learning	2009
8	Introduction to Probability and Statistics, Mendenhall , Cengage learning	2011

6EI7A MICROPROCESSOR & MICROCONTROLLER LAB

B.Tech. (EI) 6th sem.
2P

Max. Marks: 75
Exam: 3 H

S.No.	Contents
	Following exercises are to be done in 8051 Assembly Language.
	Simple programs
1	Add 'N' 8 Bit Numbers
2	Transfer Data from Code Memory to Internal Memory
3	Convert a given Hex number to BCD
4	Implement a Four Variable Boolean Function using K-Map Minimization.
5	Convert deg. Centigrade to deg. Fahrenheit
	Complex programs
6	16 bit Multiplication (use add and shift method)
7	Find Largest and Smallest Numbers among 10 Numbers.
8	Using Look up Table and DPTR as the Base find Square of a Number in the Accumulator
9	Implement a Mathematical Calculator which executes various Arithmetic operations based on the choice entered in register R4.
	8051 Interfacing Programs
10	Interface LED Bank with 8051 to flash LED's using timer.
11	Interface Seven Segment Display with 8051.
12	Interface Stepper Motor with 8051 in Continuous and Step mode
13	Interface D/A converter with 8051.
14	Interface A/D converter MCP3204 with 8051 using SPI.

6EI8A ELECTRONIC INSTRUMENTATION LAB**B.Tech. (EI) 6th sem.
2P****Maximum Marks: 75
Exam Hours: 3**

S.No.	Contents
1	Measurement of following parameters of op-amp : (a) Input impedance. (b) Output impedance. (c) Input & Output offset voltage. (d) Input bias currents. (e) Slew rate. (f) Supply voltage rejection ratio (SVRR). (g) Common mode rejection ratio (CMRR). (h) Gain Bandwidth product. (i) Power consumption. (j) Transient response.
Study & make the following circuits on breadboard using op-amplifiers.	
2	(a) Differentiator (b) Integrator
3	(a) Wein's Bridge Oscillator (b) RC Phase shift Oscillator
4	Following filters for first order response. (a) High pass filter (b) Low pass filter (c) Notch filter
5	Wave generators – (a) Square wave generator (b) Saw tooth Generator
6	Instrumentation amplifier.
7	A Comparator.
8	(a) Voltage to current converter. (b) Current to voltage converter.
9	Frequency divider
10	Study and make the following circuits on bread board using 555 timer & determine the o/p frequency and Duty cycle: (a) Astable multivibrator (b) Monostable multivibrator (c) Bistable multivibrator

6EI9A CONTROL SYSTEM SIMULATION LAB-I**B.Tech. (EI) 6th sem.
2P****Maximum Marks: 75
Exam Hours: 3**

S.No.	Contents
1	Introduction to `Matlab'. Computing control software, defining systems in TF, ZPK form.
2	Use of for, while loops in Matlab programming.
3	(a). Plot step response a given TF and system in state-space. Take different values of damping ratio and natural undamped frequency and observe the difference. (b). Plot ramp and impulse response for the same.
4	For a given 2nd order system write a program to obtain time response specifications maximum overshoot, peak time, settling time etc.
5	Write a program to check for the stability of a given closed loop system by (a) Finding close loop poles (b) using Routh's stability criterion.
6	Sketch the root locus for a given system and determine the system gain. Also simulate the same using MATLAB.
7	Sketch the Bode plot (actual and asymptotic) for a given system and analyse the stability. Also simulate the same using MATLAB and find the values of GM and PM for different values of gain.
8	Design of lead controller to satisfy given specifications using bode plot.
9	Use MATLAB to plot Nyquist plot for a given system and comment upon stability.
10	To design a PID controller for the given system to meet desired specifications. Observe the response using MATLAB.

6EI10A PROCESS CONTROL LAB

**B.Tech. (EI) 6th sem.
2P**

**Maximum Marks: 75
Exam Hours: 3**

S.No.	Contents
1	To perform experiments on Linear system simulator.
2	To draw response of temperature controlled process for On/Off, P, PI, PID Controller.
3	Tuning of controllers on a pressure loop.
4	To study the design and application of Lag compensator circuits.
5	To study the design and application of Lead compensator circuit.
6	To study process simulator. (a) To perform experiments on P, PI, PD, PID controller with Process simulation. (b) To study the effect of loading the process.
7	To study the operation of linear & equal percentage type control valves and determine the Following:- (i) Valve flow coefficient (ii) characteristics of control valve (iii) Rangeability of control valves.
8	To perform experiments on Ratio Control Scheme and Cascade Control Scheme on liquid level and flow system.
9	To plot and analyze step/impulse response of a first order system in (i) Non interacting mode (ii) Interacting mode.
10	(a) Study of basic logic operations, timer, counter, arithmetic operations in PLC. (b) Problem solving In PLC. (c) To perform experiments on PLC controlled process.

6EI11A PROFESSIONAL ETHICS AND DISASTER MANAGEMENT

B.Tech. (EIC) 6th sem.
2P

Max. Marks:50
Exam Hours:3

S.No.	CONTENTS
1.	Issues on ethics and values: Moral and ethical values, classification of values , value system, deterioration of social values, social norms & social control.
2.	Profession , professionalism &ethics: Professional responsibilities, competencies and expectations .Role of a professional , person, professional accountability and professional ethics .
3.	Ethics in engineering and disaster management: Engineering professionals , role of engineers ,technology & society ,engineering as social experimentation , engineering ethics.
4.	Types of disasters: Environmental, economic & social disasters ; causes , impact and prevention , Case studies.
5.	Thoughts of ethics

TEXT BOOKS:

1. Engineering Ethics: Concepts & Cases by Harris, Cengage Learning (2013)

7E11A NEURAL NETWORKS AND FUZZY LOGIC CONTROL

**B.Tech. (EI) 7th sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	NEUROPHYSIOLOGY: Introduction: Elementary neurophysiology - From neurons to ANNs - Neuron model McCulloch-Pitts model, Hebbian Hypothesis; limitations of single-layered neural networks.	3
	APPLICATIONS OF NEURAL NETWORKS: Pattern classification, Associative memories, Optimization, Applications in Image Processing-Iris, finger print & face, Applications in decision making	3
II	THE PERCEPTRON: The Perceptron and its learning law. Classification of linearly separable patterns.	2
	LINEAR NETWORKS: Adaline - the adaptive linear element. Linear regression. The Wiener-Hopf equation. The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.	3
	MULTI-LAYER FEEDFORWARD NEURAL NETWORKS: Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettek.	5
III	FUZZY LOGIC- Introduction -Uncertainty & precision, Statistics and random process, Uncertainty in information, Fuzzy sets and membership.	3
	MEMBERSHIP FUNCTIONS: Features of membership function. Standard forms and boundaries, Fuzzification, Membership value assignment – Intuition, Inference, Neural networks. FUZZY TO CRISP CONVERSIONS: Maximum membership principle.	5
IV	DEFUZZIFICATION METHODS- Centroid method, Weighted average method, Meanmax membership.	3
	FUZZY RULE BASED SYSTEMS: Natural language, linguistic hedges, Rule based system –Canonical rule forms, Decomposition of compound rules, Likelihood and truth qualification Aggregation of Fuzzy rules. Graphical techniques of reference.	5
V	FUZZY CONTROL SYSTEM- Simple Fuzzy Logic controller, General FLC, Control System Design Problem Control (Decision) Surface, Assumptions in a Fuzzy Control System Design ,Special forms of FLC system models, Industrial application: Aircraft Landing Control Problem	5
	FUZZY ENGINEERING PROCESS CONTROL: Classical Feedback Control, Classical PID Control, Multi-input, Multi-output (MIMO) Control Systems, Fuzzy Statistical Process Control	3
	TOTAL	40

TEXT BOOKS:

1. S.N. Sivanandam, S. Sumathi and S.N. Deepa -Introduction to Neural Networks using MATLAB 6.0, Tata McGraw-Hill, (2006)
2. Timothy J. Ross -Fuzzy Logic with Engineering Applications, Third Edition, (1995)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Artificial Neural Network,Robert Schalloff,TMH	1997
2	Fundamental Of Neural Network Architecture And Application,Laurene V. Fausett,Pearson	1993
3	Neural Network Algorithm And Programing Tech,James A Freeman,Pearson	1991
4	Neural N/W For Pattern Recognition,Cristopher, M.Bhishop,Oxford	1995
5	Fuzzy Neuro Approach To Agent Application,Lee ,Raymond S.T.,New Age	2008
6	Fuzzy Logic and Neural Networks: Basic Concept And Application,A Lavala, Chemakesava R.,New Age	2012

7EI2A DIGITAL SIGNAL PROCESSING

B.Tech. (EI) 7th Sem.

Max. Marks: 100

3L+1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	SAMPLING - Discrete time processing of Continuous-time signals, continuous time processing of discrete-time signals,	5
	Changing the sampling rate using discrete-time processing.	2
II	TRANSFORM ANALYSIS OF LTI SYSTEMS - Introduction, The frequency response of LTI systems, System functions for systems characterized by LCCD (Linear Constant Coefficient Difference) equations,	4
	All-pass system, Minimum-Phase systems, Linear systems with linear phase.	3
III	STRUCTURES FOR DISCRETE-TIME SYSTEMS - Block diagram and signal flow graph representation of LCCD equations,	2
	Basic structures for IIR and FIR systems, Transposed forms.	5
IV	FILTER DESIGN TECHNIQUES - Introduction, Analog filter Design: Butterworth & Chebyshev,	3
	IIR filter design by impulse invariance & Bilinear transformation,	2
	Design of FIR filters by Windowing: Rectangular, Hanning, Hamming & Kaiser.	5
V	DFT, FFT - The Discrete Fourier transform (DFT), Properties of the DFT, Linear Convolution using DFT,	5
	Efficient computation of the DFT: Decimation-in-Time and Decimation-in frequency FFT Algorithms.	4
	Total	40

TEXT BOOKS:

1. Proakis, Manolakis, "Digital Signal Processing: Principals, Algorithms And Applications", 4th ed., Pearson Education. (2006)
2. Oppenheim, Schafer, "Discrete Time Signal Processing", 3rd ed. , PHI (2010)

REFERENCE BOOKS:

S.No.	Name of Authors/Book/Publisher	Publication Year
1.	Digital Signal Processing: A Modern Introduction, Ambardar, cengage learning	2011
2.	Introduction to Digital Signal Processing using MATLAB, Schilling	2011
3	Sanjit K Mitra, "Digital Signal Processing", 4 th ed., TMH	2013
4	Tan, Jiang, "Digital Signal Processing: Fundamentals and Applications", 2 nd ed., Elsevier	2008
5	Ifeachor, Jervis, "Digital Signal Processing", 2 nd ed., Pearson Education	2009

7EI3A DIGITAL IMAGE PROCESSING

B.Tech. (EI) 7th Sem.

Max. Marks: 100

3L+1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	DIGITAL IMAGE FUNDAMENTALS: Image sensing and acquisition, Image sampling and quantization, Representing digital images, Spatial and gray-level resolution,	3
	Spatial operations, Vector & matrix operations, Zooming and Shrinking of digital images. RGB and HSI Color models	3
II	BASIC IMAGE OPERATIONS: Intensity transformation functions, Histogram equalization, Spatial filtering for image smoothing,	3
	Image sharpening by first and second order derivatives, Image smoothing and sharpening using frequency domain filters	5
III	IMAGE RESTORATION: Image restoration model, Noise Models, Spatial and frequency properties of noise, noise probability density functions,	3
	Noise only- spatial filter, Mean, order Statistic and adaptive filters, Concepts of inverse and Wiener filtering	5
IV	MORPHOLOGICAL IMAGE PROCESSING: Erosion and Dilation, Opening and closing,	3
	morphological algorithms for Boundary extraction, thinning, pruning, smoothing and thickening	5
V	IMAGE SEGMENTATION AND COMPRESSION: Edge based segmentation, Edge detection masks, Gradient operators,	3
	Thresholding, Region growing, Watershed transform,	3
	Fundamentals of image compression; Loss-less compression techniques; Lossy compression techniques, compression standards	4
	Total	40

TEXT BOOKS:

1. Gonzalez, Woods and Eddins, “Digital Image Processing”, 3rd ed. , Pearson Education (2010)
2. Anil K Jain, “Fundamentals of Digital Image Processing”, 4th ed., Prentice Hall (2010)

REFERENCE BOOKS:

SN	Name of Authors/Book/Publisher	Publication Year
1	Tamal Bose, “Digital Signal and Image Processing”, ”, 3 rd ed. , John Wiley	2005
2	Sonaka,Hlavac and Boyle, “Image Processing, Analysis and Machine Vision”, 3 rd ed. , Cengage Learning	2013
3	Pratt, “Digital Image Processing”, 4 th ed. , John Wiley	2001
4.	Image Processing, Analysis, and Machine Vision, Sonka, cengage learning	2006

7EI4A ANALYTICAL & ENVIRONMENTAL INSTRUMENTATION**B.Tech. (EI) 7th sem.****Max. Marks: 100****3L+0T****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	SPECTROSCOPIC ANALYSIS- Absorption and reflection techniques, Atomic techniques emission, absorption and fluorescence, X-ray spectroscopy, Photo acoustic spectroscopy, Microwave spectroscopy, Mass spectrometers.	6
II	GAS ANALYSIS - Infrared and ultraviolet absorption analyzers, Paramagnetic oxygen analyzers, Thermal conductivity analyzers and Chemiluminescence analyzers.	8
III	CHROMATOGRAPHY- Paper and thin layer chromatography. Basic parts of gas chromatography, Types of columns, Detection systems- thermal conductivity, Flame ionization, Electron capture detector. Types of liquid chromatography, Liquid chromatography, Column and detection systems.	10
IV	ENVIRONMENTAL POLLUTION MONITORING- Air pollutants, Air pollution monitoring instruments- carbon mono oxide, sulphur dioxide, nitrogen oxide, hydro carbon & ozone. Smoke monitor, Dust monitor, Visible emission monitoring system.	10
V	LIQUID ANALYSIS- PH meter, Conductivity meter, Analyzers for measurement of ammonia, silica, sodium and dissolved oxygen.	6
	TOTAL	40

TEXT BOOKs:

1. Instrumentation technology, Jones E.B., Newnes-Butterworths. **1974**

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Instrument Engineer's Hand Book, Process Meas. & Analysis, Bela G. Liptak, Butterworth-Heinemann Ltd.	1995
2	Mechanical & Industrial Measurements, Jain R.K., Khanna Publications	1988
3	Handbook of Analytical Instruments, Khandpur R.S., Tata McGraw Hill.	2006
4	Principles of instrumental Analysis, Douglas A Skoog, Cengage Learning.	1998

7EI5A INSTRUMENTATION IN INDUSTRIES

**B.Tech. (EI) 7th sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	PROCESS INDUSTRIES INSTRUMENTATION – Organisation for Instrument Engineering, Instrument department functions & responsibilities, Process industries instrumentation, Man power classifications, Power plant training in instrumentation, Standardisation of instrumentation, Specialised process plant instrumentation.	7
II	C&I IN CHEMICAL REACTORS – Classifications, Temperature Control Schemes, Reactor Temperature Control, Reactor Temperature Control with recirculation. Cascade Temperature Control with heating & cooling capability. Pressure Control Schemes – Reactor Pressure Control by modulating gas make up, Reactor Pressure Control by throttling flow of vent gas, Continuous Control of Reactor Pressure.	8
III	C&I IN HEAT EXCHANGERS – Classifications. Steam Heaters Control Schemes – Feedback control of steam heated exchanger, Control valve in condensate line, Pumping traps, Steam trap replaced by level control, By pass control. Condensers Control Schemes – Condenser on temperature control, Condenser on Pressure Control, Condenser control by changing the wetted surface area, Hot gas by-pass control. Reboilers & Vaporizers Control Schemes – Temperature – Pressure cascade control loop on steam heater, Temperature- Flow cascade control loop on steam reboiler.	9
IV	C&I IN EVAPORATORS, DRYERS AND PUMPS – Principles & Classifications, Control Schemes of Evaporators- Horizontal tube, Forced circulation, Short tube vertical, Falling film, Long tube vertical, Agitated film evaporators. DRYERS - Principles & classifications of dryers, Control of batch and continuous dryers, PUMPS - Classification & Control schemes for pumps.	9
V	STEAM POWER PLANT INSTRUMENTATION – Selection of instrumentation, Power plant measurement (primary & secondary), Automatic control systems : Feed water control, Steam temperature control, Auxiliary control systems, Interlocks, Data logging & Computing equipments.	7
	TOTAL	40

TEXT BOOKS

1. Instrument Engineer's Hand Book: Process Control, Bela G. Liptak, Chilton Book Co. Radnor, Pennsylvania.(1995)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Industrial Instrumentation ,Krishnaswamy .K,New Age	2005
2	Fundamentals Of Industrial Instrumentation And Process Control ,William Dunn,TMH	2009
3	Process Systems Analysis And Control,Donald Coughanowr,TMH	2010
4	Process/Industrial Instruments And Control Hand Book,Gregory Mcmillan,TMH	2009
5	Process Control - Principles And Applications,Bhanot,Oxford	2008
6	Process Dynamics Control ,Dale E. Seborg,Oxford	2010
7	Advanced Process Control: Beyond Single Loop Control,Cecil Smith,Oxford	2010
8	Instrument Engineer's Hand Book: Process Measurement & Analysis, Bela G. Liptak, Butterworth-Heinemann Ltd.	1995
9	Industrial Instrumentation ,S K Singh,New Age	2010

7EI 6.1A MICROWAVE ENGINEERING

B.Tech. (EI) 7th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION - Introduction to Microwaves and their applications, Transit time effect. Rectangular Wave-guides: Solution of Wave equation modes in rectangular waveguides, Basic idea of TE and TM modes, TEM mode of propagation	8
II	MICROWAVE COMPONENTS - Theory and application of cavity resonators. Coupling to cavity, Q of Cavity resonators, Attenuators, Tees, Hybrid rings, Wave guide corners, Bends and twists, phase shifters, directional couplers, isolators, circulators.	8
III	MICROWAVE GENERATORS AND AMPLIFIERS - Theory of Velocity Modulation. Operation And Characteristics of Two-Cavity Klystron Amplifier, Reflex Klystron, TWT, Magnetrons.	8
IV	MICROWAVE SOLID STATE DEVICES - Principle of working and applications of IMPATT diode; hot Carrier Diode, PIN Diode, Tunnel diode, Gun Diode, MASER amplifiers, CCD.	8
V	MICROWAVE MEASUREMENTS - Detection of Microwaves, Basic Methods of Measurement of Frequency, Power, Scattering Parameters, VSWR, Impedance.	8
	TOTAL	40

TEXT BOOK

1. Microwave Engineering, Annapurna Das, Sisir Das, TMH. (2009)
2. Microwave Devices And Circuits, 3, Samuel Y. Liao, Pearson. (2006)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Foundations For Microwave Engineering – R.E. Collin, R.E. Collin, Wiley	2001
2	Microwave Engineering By, Pozar, Wiley	2009
3	Microwave Devices And Circuit Design, Ganesh Prasad Srivastava, Vijay Laxmi Gupta, PHI	2006
4	Microwave Semiconductor Devices, Roy Mitra, PHI	2003
5	Microwave Engineering, Raghuvanshi, cengage learning	2013

7EI6.2A ADVANCED MICROPROCESSORS**B.Tech. (EI) 7th sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	The 8086 Microprocessor Family: 8086 ARCHITECTURE- Hardware specifications, Pins and signals, Internal data operations and Registers, Minimum and maximum mode, System Bus Timing, Linking and execution of Programs.	8
II	Software & Instruction Set: Assembly language programming: addressing mode and instructions of 8086, Strings, Procedures and Macros, 8086 interrupts. Assembler Directives and operators.	8
III	Analog Interfacing: A/D and D/A converter interfacing, keyboard and display interfacing, RS 232 & IEEE 488 communication standards. An 8086 based Process Control Systems	8
IV	Digital Interfacing: Programmable parallel ports, Interfacing microprocessor to keyboard and alphanumeric displays, Memory interfacing and Decoding, DMA controller.	8
V	Multiprocessor Configurations: - Multiuser / Multi tasking operating system concepts, 8086 based Multiprocessor systems. Introduction and basic features of 286, 386, 486 & Pentium processors.	8
	TOTAL	40

TEXT BOOK

1. A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed. (2012)
2. Douglas V. Hall “Microprocessors and Interfacing Programming and Hardware” Tata Mc Graw Hill.(2000)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	A. Ray & K. Bhurchandi. “Advanced Microprocessors and Peripherals. Tata Mc Graw Hill,	2012
2	A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed.	2012
3	Introduction to Microprocessors, A. P. Mathur Mc Graw Hill	2011
4	The Intel Family of Microprocessors: Hardware and Software Principles and Applications, Antonakos, cengage learning	2012
	The 8086 Microprocessor: Programming & Interfacing the PC, Ayala, cengage learning	2007

7EI6.3A ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

B.Tech. (EI) 7th Sem.

Max. Marks: 100

3L+0T

Exam: 3 Hours

Unit	Contents	Contact Hours
I	Introduction to Artificial Intelligence: Intelligent Agents, State Space Search, Uninformed Search, Informed Search, Two Players Games, Constraint Satisfaction Problems.	09
II	Knowledge Representation: Knowledge Representation And Logic, Interface in Propositional Logic, First Order Logic, Reasoning Using First Order Logic, Resolution in FOPL	05
III	KNOWLEDGE ORGANIZATION: Rule based System, Semantic Net, Reasoning in Semantic Net Frames, Planning	10
IV	KNOWLEDGE SYSTEMS: Rule Based Expert System, Reasoning with Uncertainty, Fuzzy Reasoning	07
V	KNOWLEDGE ACQUISITION: Introduction to Learning, Rule Induction and Decision Trees, Learning Using neural Networks, Probabilistic Learning Natural Language Processing	09
TOTAL		40

TEXT BOOK:

1. Elaine Rich and Kevin Knight, Artificial Intelligence 3/e, TMH (1991)
2. PADHY: ARTIFICIAL INTELLIGENCE & INTELLIGENT SYSTEMS, Oxford(2005)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	James A Anderson, An introduction to Neural Networks. Bradford Books	1995
2	Dan. W Patterson, Artificial Intelligence and Expert Systems, PHI	1990
3	Kumar Satish, "Neural Networks" Tata Mc Graw Hill	2004
4	S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.	2006
6	Siman Haykin, "Neural Netowrks" Prentice Hall of India	1990
7	Artificial Intelligence, Kaushik, cengage learning	1997

7EI7A CONTROL SYSTEMS SIMULATION LAB II

B.Tech. (EI) 7th sem.

2P

Max. Marks:75

Exam: 3 Hours

S.No.	Contents
	The Lab work includes exercises based on following in MATLAB
1	Representation of a system in State Space, Conversion from TF to State Space, Discretizing the given Continuous Time System.
2	Representing the System in various Canonical Forms,
3	Diagonalization, Finding Eigen values, Eigenvectors
4	Computation of State Transition Matrix
5	Plotting State Responses for given inputs.
6	Check for Controllability, Observability of the System.
7	Pole placement design using state feedback.
8	Design Full Order Observer to Estimate States for the given System
9	Design Reduced Order Observer for the given System
10	Using Combined Estimator and Control Law Plot the Response for the given System
11	Simulate different systems for plotting responses in SIMULINK.

7EI8A ANALYSTICAL INSTRUMENTATION LAB

B.Tech. (EI) 7th sem.

Max. Marks:75

2P

Exam Hours:3

S.No.	CONTENTS
1.	To measure pH value of given solution using pH meter.
2.	To determine suspended particular matter using right volume air samples.
3.	Find out concentration of (Na or K) by flame photo meter in the given sample.
4.	To measure transmittance and absorption of a solution using Single beam spectro photo meter.
5.	To study water analysis kit & measure pH, temperature, conductivity, dissolved O ₂ of a given solution.
6.	To measure the conductivity of solution indicator controller.
7	To study the analysis of flue gases.
8	To study ion selective electrode.
9	To study pH monitor and controller.
10	To study silica analyzer and zirconia based oxygen analyzer.
11.	To study gas/ liquid chromatograph.

7EI9A INDUSTRIAL ECONOMICS & MANAGEMENT

B.Tech. (EI) 7th sem.

Max. Marks:50

2P

Exam Hours:3

S.No.	CONTENTS
1.	Framework of industrial economics – organizational forms and alternative motives of the firm, industrial efficiency, theory of profitability, market structure, principles of costing.
2.	Approaches to industrial location analysis, Productivity analysis, Input-Output analysis, Concentration of economic power. New Industrial Policy – Critical analysis, Role of technology and entrepreneurship in industrial development.
3.	Industrial project appraisal- classification of industries, industrial legislations in India, recent trends in MNCs, LPG, FDI & joint ventures, methods of project evaluation-NPV, CBA, IRR, break-even analysis.
4.	Management – Principles of management, functions of management- planning, organizing, staffing, directing, controlling, co-ordinating, decision making
5.	Emerging issues – Total quality management, JIT, quality circle, KANBAN, benchmarking, six sigma, quality management, ISO 9000, ISO 14000, Customer relationship management (CRM).

TEXT BOOKS:

1. Subburay, Total quality management, TMH. (2011)
2. Barthwal R.R- industrial economics . wiley eastern limited

Reference Books:

1. Tirole Jean – the theory of industrial organization . MIT PRESS
2. Ahluwalia I.J – industrial growth in india . Oxford university press
3. Divine P.J and R.M Jones et Al- an introduction In industrial economics .George allen &Unwin limited London.
4. Peter F. drucker – principles and practice of management . Prentice hall ltd .

8EI1A INDUSTRIAL ELECTRONICS

**B.Tech. (EI) 8th sem.
3L+1T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	SEMICONDUCTOR POWER DEVICES - Basic characteristics & working of Power Diodes, Diac, SCR, Triac, Power Transistor, MOSFETs, IGBT, and GTO	7
II	RECTIFIERS & INVERTERS - Working principles of single and three phase bridge rectifiers, Voltage and current source inverters	8
III	POWER SUPPLIES: Principle of operation of choppers. Step up, Step down and reversible choppers. High frequency electronic ballast, Switch Mode Power Supply: Fly back converter, forward/buck converter, Boost converter and buck-boost converter. Uninterruptible Power Supply.	10
IV	MOTOR CONTROL: Introduction to speed control of DC motors using phase controlled converters and choppers, Basic idea of speed control of three phase induction motors using voltage and frequency control methods.	8
V	Stepper Motors: Variable reluctance, Permanent magnet and hybrid stepper motors. Induction and dielectric heating control.	7
TOTAL		40

TEXT BOOKs:

1. Power Electronics Principles & Applications, Joseph Vithayathil, TMH , (2010).
2. Power Eletronics, Ravish Singh, TMH, (2012).

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Industrial Electronics And Control, Ttti, TMH	2001
2	Power Electronics: Converters Applications., Mohan, Robbins, Wiley	1995
3	Power Electronics, Moorthi, Oxford	2005
4	Elements Of Power Electronics, Krein, Oxford	1998
5	Power Electronics, R.S.Murthy, Pearson	2012
6	Power Electronics: Circuits, Devices And Applications	2004

8EI2A NONLINEAR CONTROL SYSTEMS**B.Tech. (EI) 8th sem.
3L+1T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Nonlinear Control, Common Nonlinearities in Control systems, Points of Differences in Linear And Nonlinear System Behavior,	6
II	Phase Plane Analysis : Phase Portraits, Singular Points, Construction of Phase Portraits, Method of Isoclines, Symmetry in Phase Portraits, Jump Resonance, Limit Cycles, Existence of Limit Cycles, Poincare-Bendixson Theorem	6
III	Describing Function Fundamentals: Describing Functions of Common Nonlinearities-computing describing functions, describing functions of common nonlinearities- describing functions analysis of non linear systems-stability analysis.	8
IV	Fundamentals of Lyapunov Theory: Nonlinear Systems and Equilibrium Points, Concepts of Stability, Linearization and Local Stability, Lyapunov's Direct Method, Equilibrium Point Theorems, Krasovskii's method- variable gradient method	8
V	Nonlinear Control System Design: Feedback Linearization and the Canonical Form, Input State Linearization, Input-Output Linearization, Gain Scheduling, Sliding Control, Model Reference Adaptive Control.	8
	TOTAL	40

TEXT BOOK:

1. Jean-Jacques E. Slotine, "Applied Nonlinear Control", Prentice Hall Englewood Cliffs, New Jersey, (1991).

REFERENCE BOOKS:

S.No.	Name of Authors/Publication/Book	Publication Year
1	Vidyasagar.M, "Nonlinear System Analysis", Prentice Hall Englewood Cliffs, New Jersey,	1978
2	M. Gopal "Digital Control & State variable Methods", Tata-Mc-Graw hills	2003

8EI3A DISTRIBUTED CONTROL SYSTEM

B.Tech. (EI) 8th sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION- Hierarchical organization for a process computer control and computer system structure for a manufacturing complex. Centralized and distributed control concept. Lower level and higher level computer tasks and duties. Functional requirement of DPCS. Aims of plant automation and distributed computer control systems and subsystems. DPCS system configuration and integration with PLCs and computers.	6
II	ARCHITECTURE- Overviews of DPCS, systems architectures, data base organization. DPCS elements, comparison of different DPCS systems, state of the art in DPCS, configuration of control unit, different cards (I/O, O/P , Memory , PLC etc) system implementation concepts, work stations and its key – functions and function chart.	8
III	DCS DISPLAYS- Standard and user defined displays, continuous process display, Ground display, overview display, detail display, graphic display, trend display, loop display, alarm summary display, annunciator display, batch/ sequence display, tuning display, tuning panel, instrument faceplate.	8
IV	DATA COMMUNICATIONS LINKS AND PROTOCOL - Communication Hierarchy (point to point to field bus) Network requirements, ISO reference model. Transmission media, network topologies, internetworking , data transmission , bus access methods ,error handling Field buses ,MAP and TOP Protocols. Features and capabilities of various field buses. FB standardization, comparison of MODBUS, PROFIBUS and FIPBUS, HART protocol, IEEE project 1002 on LAN implementation.	10
V	DCS CONTROL FUNCTIONS- control unit, sequential control, system maintenances, utility, switch instrument, batch system builder, graphic builder, feedback control builder, security, and process reporting function.	8
	TOTAL	40

TEXT BOOKS:

S.No.	Name of Authors /Books /Publisher	Year of Publication
1	John.W. Webb Ronald A Reis, “Programmable Logic Controllers - Principles and Applications”, 4th Edition, Prentice Hall Inc., New Jersey.	1998
2	Lukcas M.P, “Distributed Control Systems”, Van Nostrand Reinhold Co., New York.	1986

REFERENCE BOOKS:

S.No.	Name of Authors /Books /Publisher	Year of Publication
1	Frank D. Petruzella, “Programmable Logic Controllers”, 2nd Edition, McGraw Hill, New York.	1997
2	Deshpande P.B and Ash R.H, “Elements of Process Control Applications”, ISA Press, New York.	1995
3	Curtis D. Johnson, “Process Control Instrumentation Technology”, 7th Edition, Prentice Hall, New Delhi, 2002	2002
4	Krishna Kant, “Computer-based Industrial Control”, Prentice Hall, New Delhi, 1997	1997
5	Process/Industrial Instruments And Control Hand Book, Gregory Mcmillan, TMH.	2009
6	Process Control - Principles And Applications, Bhanot, Oxford.	2008
7	Process Dynamics Control , Dale E. Seborg, Oxford.	1994
8	Advanced Process Control: Beyond Single Loop Control, Cecil Smith, Oxford.	2010

8EI4.1A WIRELESS COMMUNICATION

B.Tech. (EI) 8th sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Radar Fundamentals - Basic Radar System, Accuracy & Resolution, Radar Range Equitation, Radar Display, Radar Classifications, Basic Block Diagram of CW Radar, FM CW Radar, Moving Target Indicator Radar, Pulse Doppler Radar & Tracking Radar, Range & Velocity Resolution of Radar	8
II	Propagation Phenomena - Fundamentals of fading, Multipath channels, Fresnel zone clearance, bending of radio beam, Effective earth radius, Spread Spectrum signals: Direct-sequence spread spectrum signals, p-n sequences, Frequency-hopped spread spectrum signals, Code-division multiplexing.	8
III	Multiple Access Techniques - FDMA, TDMA and CDMA with reference to mobile radio and satellite systems. TDMA based networks, OFDM and its characteristics, Packet radio multiple access techniques. CDMA based networks: Architecture, Air interface, Call processing, power control, Rake receiver concept and performance of CDMA system.	8
IV	Cellular Wireless Networks- , GSM: Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio like control. Cordless systems and WLL, Mobile IP, Wireless access protocol. Wireless LAN's: Technology, IEEE 1002.11 standards, Broadband Wireless 1002.16, Blue tooth, Wi-Fi, Wi-Max, Zigbee & RFID technology.	8
V	Satellite Communication - Elements of satellite communication: Frequency bands, Transmission and Multiple access. Satellite orbit and description- orbital period and velocity, effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Satellite Link: basic link analysis, Geostationary orbit, Satellite description. Earth Station antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability.	8
	TOTAL	40

TEXT Books:

1. William Stallings, Wireless Communication and Networks, Pearson Education (2013)
2. Rappaport, T.S., Wireless Communications, Pearson Education (2013)

REFERENCE Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Gottapu Sasibhushana Rao, Mobile Cellular Communications, Pearson Education	2013
2	Singal, T.L, Wireless Communication, Tata McGraw Hill	2011
3	Vijay Kr. Garg, Wireless Communications and Networking, Morgan Kaufmann, Elsevier	2013
4	Blake, Wireless Communication Technology, Cengage Learning	2013
5	W.C.Y. Lee , Mobile Cellular Telecommunications , Tata McGraw Hill	2011
6	Wireless Communications and Networking, Price, TMH	2014
7	Pratt, Bostain, Satellite Communications, Wiley India	2011
8	Mark Zhuang, Wireless Communications and Networking, Prentice Hall of India	2003
9	Simon Haykin, Modern Wireless Communications, Pearson Education	2005
10	Price, Fundamentals of Wireless Networking, Tata McGraw Hill	2012

8EI4.2A MEMS and Nano Technology

**B.Tech. (EI) 8th sem.
3L+0T**

**Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Nanoelectronics: Top Down and Bottom UP Approach, Nanotechnology Potentials, Idea of band structure – Metals, Insulators and Semiconductors. Effect of crystal size on density of states and band gap, Electronic structure of nanoparticles. Nanostructured crystals, Size and dimensionality effects – Single electron tunneling – Applications – Superconductivity, Graphenes and CNT.	08
II	Nano Fabrication and Patterning Techniques: Si processing methods, Cleaning/etching, Oxidation, Gettering, doping, Epitaxy. CVD & MOCVD, Physical Vapor Deposition (PVD), Liquid Phase Techniques, Self assembly and catalysis. Etching: Wet and Dry, Nanolithography, Nanoimprinting, X-Ray Lithography(XRL), Particle beam lithography(e-beam, FIB, shadow mask evaporation),	09
III	General Characterization Techniques: X- Ray Diffraction studies – Bragg’s law – particle size – Scherrer’s equation, Infrared Spectroscopy of Semiconductors, Raman Spectroscopy, Dynamic Light Scattering (DLS), NMR Spectroscopy, ESR Spectroscopy. photo electron spectroscopy(XPS)-SEM,TEM,STM, Atomic force microscopy(AFM).	09
IV	Electrical, Magnetic, Mechanical and Optical Properties and Applications : Electronic and electrical properties -One dimensional systems-Metallic nanowires, Quantum dots -Two dimensional systems - Quantum wells. Magnetic properties -Transport in a magnetic field. Mechanical properties, Optical properties, Evolving interfaces of Nano in NanoBiology, Nano Sensors and Nanomedicines	07
V	MEMS and Microsystems: Evolution of Micro Fabrication – Micro Systems and Microelectronics. Application of MEMS in Various Fields. Introduction – Substrate and Wafer, Active Substrate Material. Silicon as a substrate material, MEMS packaging. Case study on pressure sensor with packaging.	07
	TOTAL	40

TEXT BOOKS

1. Nano Essentials, T Pradeep, Mc Graw Hill, (2008).
2. Nanotechnology-Enabled Sensors, Kourosh Kalantar-zadehand Benjamin Fry, Springer, (2007).

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Fundamental of Nanoelectronics, George W. Hanson, Pearson	2009
2	Principal of Nanotechnology, G. A. Mansoori, Wiley	2005
3	Mems and Micro Systems, Mahalik, TMH	2007
4	MEMS, Gabriel, Wiley	2006
5	MEMS, A.R. Jha, CRC	2008
6	Nano Fabrication, CRC	2012
7	MEMS & Microsystems, Design and Manufacture, Tai-Ran HSU, TMH	2013

8EI4.3A COMPUTER NETWORKS**B.Tech. (EI) 8th Sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Queuing Theory- Pure birth, Pure death & Birth-death processes,	2
	Mathematical models for M/M/1, M/M/ ∞ , M/M/m, M/M/1/K and M/M/m/m queues. Little's formula.	5
II	Physical and Data link layer – OSI model & TCP/IP reference models, Line coding schemes, Packet & Circuit switching, Virtual circuit network,	3
	Framing, Simplex protocol, Simplex stop & wait protocol, Sliding window protocol, Go back N protocol, selective repeat,	3
	HDLC, PPP	2
III	MAC Sublayer- Static & dynamic channel allocation, Multiple Access Protocols: ALOHA, slotted ALOHA, CSMA, Token Bus, Token Ring, FDDI	4
	IEEE standards 1002.3 & 1002.5, Virtual circuit network: frame relay & ATM frame and protocol architecture,	3
	Network connection devices: Hubs, Bridges, switches, Routers and Gateways	2
IV	Network Layer- IPv4 & IPv6 addressing and datagram, Internetworking, Non-adaptive & Adaptive routing algorithms,	4
	Distance vector routing and Link state routing algorithms, OSPF and BGP	4
V	Transport and Application Layer- Client server paradigm, TCP frame format, Data traffic descriptors, QoS, Congestion and its control algorithms,	4
	Improving QoS by different queuing schemes, leaky bucket and token bucket implementation, Domain name, DNS in the internet, SMTP, FTP, WWW, HTTP	4
	Total	40

Text Book:

1. Forouzan, "Data Communications and Networks", 5th ed., Mcgraw-Hill, (2006).

REFERENCE BOOKS:

SN	Name of Authors/Book/Publisher	Publication Year
1	Tanenbaum, "Computer Network", 5 th ed., Pearson Education	2012
2	Leon Garcia, Widjaja, "Communication Networks", 2 nd ed., Mcgraw-Hill	2003
3	Stallings, "Data and Computer Communications", 10 th ed., Pearson Education	2013
4	Bertsekas, Gallager, "Data Networks", 2 nd ed., PHI	1992
5	Computer Networks, Dave, cengage learning	2003
6	Fundamentals of Networking and Data Communications, White, cengage learning	2013

8EC5A INDUSTRIAL ELECTRONICS LAB

B.Tech. (EI) 8th Sem.
3P

Max. Marks: 100
Exam Hours: 3

S.No.	Contents
1.	Study the characteristics of SCR and observe the terminal configuration, Measure the breakdown voltage, latching and holding current. Plot V-I characteristics.
2.	Perform experiment on triggering circuits for SCR. i.e. R-triggering, R-C triggering and UJT triggering circuit.
3.	Study and test AC voltage regulators using triac, antiparallel thyristors and triac & diac.
4.	Study and obtain the waveforms for single-phase bridge converter.
5.	Perform experiment on single phase PWM inverter.
6.	Perform experiment on buck, boost and buck-boost regulators.
7.	Control speed of a dc motor using a chopper and plot armature voltage versus speed characteristic.
8.	Control speed of a single-phase induction motor using single phase AC voltage regulator.
9.	i) Study single-phase dual converter. ii) (ii) Study speed control of dc motor using single-phase dual converter.
10.	Study single-phase cycloconverter.
11.	Perform experiment on Motor control – open loop & closed loop.
12.	Design, observe and perform experiment on various type of pulse generation from DSP/ FPGA Platform. Perform experiment for PWM inverters and choppers.

8EI6A REAL TIME CONTROL SYSTEM LAB

B.Tech. (EI) 8th Sem.

Max. Marks: 50

2P

Exam Hours: 2

S.No.	Contents
1	Characteristics of control valve
2	Closed loop response of flow control loop.
3	Closed loop response of level control loop
4	Closed loop response of temperature control loop
5	Operation of on-off controlled thermal process. Response of on-off controller
6	Response of P+I+D controller. Tuning of PID controller
7	Measurement & Control of level using PID.
8	Measurement & Control of flow using PID
9	Measurement & Control of pressure using PID.
10	Measurement & Control of flow using PLC.
11	Measurement & Control of level using PLC.
12	Measurement & Control of pressure using PLC.
13	Measurement & Control of temperature using PLC.
14	Using SCADA for process control: <ul style="list-style-type: none">• preparation of process graphics• tagging trends• reporting• Process monitoring and control.
15	Study of Communication and Configuration of HART Field Devices: <ul style="list-style-type: none">• Communicate with HART device• Re-ranging of HART Field Devices• Basic setup of HART Device• Detailed setup of HART Device

16	<p>Study of Process Calibrator:</p> <ul style="list-style-type: none"> • Test & Calibration of Process Indicators & Controllers using • Resistance, RTD, Thermocouple • mili Volts, 4-20 mA, • Frequency & Volt • Error calculation.
17	Study of Thermal Imager: Non-contact type temperature measurement of Process, Machines, Material etc.
18	Study of Vibration Analyzer: Measurement and Analysis of vibration in electrical and mechanical machines.
19	Familiarization with the Instrumentation and Process Control Training System (IA-FLTP): Process Workstation, Instrumentation Workstation, PID Controller, ON/OFF Controller, Programmable Logic Controller, Signal Isolator, Flow Meter, Level Transmitter, Temperature Sensor, Emergency Push-Button, Pneumatic Unit, Trend Recorder, Pressure Gauge, Pressure Transmitter, Pneumatic Control Valve, Accessories, Basic Setup.
20	I.S.A. Standard and Instrument Symbols. Introduction to Measurement, Measuring Instruments.
21	Study of Interacting systems and Non-interacting systems.

8EI7A APPLIED INSTRUMENTATION LAB

B.Tech. (EI) 8th sem.
3P

Max. Marks:100
Exam Hours:3

S.No.	CONTENTS
1.	Measurement of optical power attenuation and numerical aperture in a plastic optical fiber.
2.	Study and measurement of losses in optical fiber.
3.	Measurements of various amplitudes and time intervals between each segment of ECG, Measurement of R-R interval and calculation of Heart Rate.
4.	Determination of Heart Axis by measuring QRS amplitude in the different leads (Lead I, Lead II and Lead III) and Plotting Einthoven Triangle.
5.	Measurement of Heart rate variability (HRV) and analysis using time and frequency based approach.
6.	Recording of blood pressure using sphygmomanometer & stethoscope and relate with heart rate.
7.	Recording of the EMG Signal for different stress on the muscle.
8.	To find out various lung capacity measurements using pneumotachograph.
9.	Study of EEG Signal, to measure the amplitude, frequency & nature of EEG.
10.	Design of an instrumentation amplifier for amplification of the low level ECG signals for gain 1000 and CMRR >100 dB and flat frequency response from 4 to 40 Hz.