Dibrugarh University
Bachelor Degree in
Power Electronics and Instrumentation Engineering

Details of course structure for B.E. in Power Electronics & Instrumentation Engineering

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Semester I

Sl No.	Course Code	Course Title	L	T	P	Contact hrs/wk	Credit
01	HS1C01	Sociology	2	0	0	2	2
02	HS1C02	Business Communications	2	0	0	2	2
03	MA1C01	Mathematics I	3	1	0	4	4
04	PH1C01	Applied Physics I	3	1	0	4	4
05	PH1C02	Applied Physics Laboratory I	0	0	2	2	1
06	CH1C01	Engineering Chemistry I	3	1	0	4	4
07	CH1C02	Engineering Chemistry Laboratory I	0	0	2	2	1
08	CE1C01	Engineering Graphics	1	3	0	4	4
09	EE1C01	Basic Electrical Engineering	3	1	0	4	4
10	EE1C02	Basic Electrical Engineering Laboratory	0	0	2	2	1
11	ME1C01	Engineering Workshop I	0	0	2	2	1
Total						**32**	**28**

SEMESTER II

Sl No.	Course Code	Course Title	L	T	P	Contact hrs/wk	Credit
01	HS1C03	Economics for Engineers	2	0	0	2	2
02	HS1C04	Presentation Skills	1	2	0	3	2
03	MA1C02	Mathematics II	3	1	0	4	4
04	PH1C03	Applied Physics II	3	1	0	4	4
05	PH1C04	Applied Physics Laboratory II	0	0	2	2	1
06	CH1C03	Engineering Chemistry II	3	1	0	4	4
07	CH1C04	Engineering Chemistry Laboratory II	0	0	2	2	1
08	CS1C01	Computer Programming	3	0	0	3	3
09	CS1C02	Computer Programming Laboratory	0	0	2	2	1
10	ME1C02	Engineering Mechanics	3	1	0	4	4
11	ME1C03	Engineering Mechanics Laboratory	0	0	2	2	1
12	ME1C04	Engineering Workshop II	0	0	2	2	1
Total						**34**	**28**
13	AC1C01	Environmental studies					0

*Mandatory Courses, with only a pass in each required to qualify for Degree award from the concerned institution

COURSE STRUCTURE OF SEMESTER-III:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	BS301	Mathematic-III	3	1	0	4	4
02	PI302	Electrical Network Theory	3	1	0	4	4
03	ET303	Digital Circuits & Logic Design	3	1	0	4	4
04	ET304	Electronic Devices and Circuits	3	1	0	4	4
05	PI305	Transducers and System Components-I	4	0	0	4	4
06	PI306	Electrical Engineering Materials	3	0	0	3	3
07	ME102	Basic Thermodynamics and Fluid Mechanics	2	0	0	2	2
Practicals							
08	ET303L	Digital Circuits & Logic Design Laboratory	0	0	2	2	1
0 9	ET304L	Electronic Devices and Circuits Laboratory	0	0	2	2	1
10	PI305L	Transducers & System Components-I Laboratory	0	0	2	2	1
		Total	20	3	8	31	28

COURSE STRUCTURE OF SEMESTER-IV:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	BS401	Mathematics-IV	3	1	0	4	4
02	PI402	Analog Electronics Circuits	4	0	0	4	4
03	ET403	Signals and Systems	3	1	0	4	4
04	PI404	Transducers & System Components –II	3	1	0	4	4
05	PI405	Electrical Machines	4	0	0	4	4
06	ET406	Computer Architecture and Organization	3	0	0	3	3
Practicals/projects							
07	PI402L	Analog Electronics Circuits Laboratory	0	0	2	2	1
08	ET403L	Signals & Systems Laboratory	0	0	2	2	1
10	PI404L	Transducers and System Components-II Laboratory	0	0	2	2	1
11	PI405L	Electrical Machines Laboratory	0	0	2	2	2
		Total	20	3	8	31	28

COURSE STRUCTURE OF SEMESTER-V:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	BS501	Mathematics-V	3	1	0	4	4
02	PI501	Control Systems	3	1	0	4	4
03	ET502	Linear ICs and Applications	3	1	0	4	4
04	PI503	Communication Systems	3	1	0	4	4
05	ET504	Electromagnetic Field Theory	3	1	0	4	4
06	PI505	Electrical & Electronics Measurement	4	0	0	4	4
Practicals							
07	PI501L	Control System Laboratory	0	0	2	2	1
08	PI502L	Linear Integrated Circuits Laboratory	0	0	2	2	1
09	PI503L	Communication Systems Laboratory	0	0	2	2	1
10	PI505L	Electrical & Electronics Measurement Laboratory	0	0	2	2	1
		Total	19	5	8	32	28

COURSE STRUCTURE OF SEMESTER-VI:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	HS601	Introduction to Accountancy & Management	3	1	0	4	4
02	ET601	Digital Signal Processing	3	1	0	4	4
03	PI602	Industrial Process Control	3	1	0	4	4
04	PI603	Industrial Instrumentation	4	0	0	4	4
05	PI604	Microprocessors and Microcontrollers	4	1	0	5	5
06	PI605	Power Electronic Drives	3	0	0	3	3
Practicals							
07	ET601L	Digital Signal Processing Laboratory	0	0	2	2	1
08	PI603L	Industrial Instrumentation Laboratory	0	0	2	2	1
09	PI604L	Microprocessors and Microcontrollers Laboratory	0	0	2	2	1
10	PI605L	Mini Project	0	0	2	2	1
		Total	20	4	8	32	28

COURSE STRUCTURE SEMESTER-VII:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	PI701	Optoelectronics	4	0	0	4	4
02	PI702	Switched mode Power Conversion	3	0	0	3	3
03	PI703	Power Electronics Devices and Circuits	4	0	0	4	4
04	PIL1..	Elective-I	4	0	0	4	4
05	OE…..	Elective-II (Open)	4	0	0	4	4
Practicals/Pojects/Seminar/ Viva							
06	PI703L	Power Electronics Devices and Circuits Laboratory	0	0	2	2	1
07	PI706	#Industrial Summer Training Report/Viva	0	0	2	2	2
08	PI707	General Seminar	0	0	2	2	2
09	PI708	Project work– I	0	0	4	4	4
		Total	19	0	0	30	28

Industrial Summer Training: Training of 4weeks duration carried out during the summer break after the 6th semester. The report will be submitted in the 7th semester

Elective-I: (VII th Semester)

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	PIL11	**Biomedical Instrumentation**	4	0	0	4	4
02	PIL 12	Advanced Communication Engineering	4	0	0	4	4
03	PIL 13	**Computer Networks**	4	0	0	4	4
04	PIL14	**Advanced Computer Programming**	4	0	0	4	4
05	PIL15	Artificial Intelligence	4	0	0	4	4
06	PIL16	Power Plant Instrumentation	4	0	0	4	4
07	PIL17	**Intelligent Instrumentation**	4	0	0	4	4
08	PIL18	Any other subject offered from time to time with the approval of the university	4	0	0	4	4

Open Elective: (VII th Semester)

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	OE01	Engineering Risk-Benefit analysis	4	0	0	4	4
02	OE03	Disaster Management	4	0	0	4	4
03	OE04	Project Management	4	0	0	4	4
04	OE05	Rural Technology and Community Development	4	0	0	4	4
05	OE71	Database Management Systems	4	0	0	4	4

06	OE72	Information Theory and Coding	4	0	0	4	4
07	OE73	Design and Analysis of Algorithms	4	0	0	4	4
08	OE74	Optimization Techniques	4	0	0	4	4
09	OE75	Cloud Computing	4	0	0	4	4
10	OE76	Software Engineering	4	0	0	4	4
11	OE77	Engineering System Analysis and Design	4	0	0	4	4
12	OE78	Soft Computing	4	0	0	4	4
13	OE79	Mechatronics	4	0	0	4	4
14	OE80	Industrial Economics	4	0	0	4	4
15	OE81	Any other subject offered from time to time with the approval of the university	4	0	0	4	4

Elective-III:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	ETL32	Speech and Audio Processing	4	0	0	4	4
02	ETL33	Digital Image Processing	4	0	0	4	4
03	ETL34	Satellite Communications	4	0	0	4	4
04	ETL36	Fuzzy Logic and Neural Network	4	0	0	4	4
05	ETL38	Artificial Intelligence and Robotics	4	0	0	4	4
06	PIL31	BioElectronics	4	0	0	4	4
07	PIL32	**Biomedical Signal Processing**	4	0	0	4	4
08	PIL33	**Renewable Energy Technologies**	4	0	0	4	4
09	PIL34	Quality Control and Reliability	4	0	0	4	4
10	PIL35	Any other subject offered from time to time with the approval of the university	4	0	0	4	4

COURSE STRUCTURE SEMESTER-VIII:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	PI801	Power Electronics Circuits and Applications	4	0	0	4	4
02	PI802	Analytical Instrumentation	4	0	0	4	4
03	PIL3..	Elective-III	4	0	0	4	4
04	PIL4..	Elective-IV	4	0	0	4	4
Project/Viva-voce							
05	PI805	Comprehensive Viva Voce	0	0	0	0	2
06	PI806	Project Work– II	0	0	8	8	8
07	PI806	Project Work– II Viva-voce	0	0	0	0	2
		Total	16	0	8	24	28

* The project work-II will be examined by the department of Power Electronics and Instrumentation Engineering and internal marks will be awarded by the department and viva-voce marks will be awarded by the external examiner, appointed by Dibrugarh University based on his/her assessment.

Elective-IV: (Departmental Elective)

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	PIL41	Biomedical Image Processing	4	0	0	4	4
02	PIL42	**Advanced Process Control**	4	0	0	4	4
03	PIL43	**Utilization of Electric Power & Machine**	4	0	0	4	4
04	PIL44	Introduction to BioTechnology	4	0	0	4	4
05	PIL45	Computer Vision and Video Processing	4	0	0	4	4
06	PIL46	Any other subject offered from time to time with the approval of the university	4	0	0	4	4

COURSE STRUCTURE OF SEMESTER I

Course structure for Semester-I is same as that of other branches of engineering at Jorhat Institute of Science and Technology, Jorhat and at Jorhat Engineering College, Jorhat under Dibrugarh University which has already been approved and adopted by Dibrugarh University with effective from academic session 2016-17

COURSE STRUCTURE OF SEMESTER II

Course structure for Semester-II is same as that of other branches of engineering at Jorhat Institute of Science and Technology, Jorhat and at Jorhat Engineering College, Jorhat under Dibrugarh University which has already been approved and adopted by Dibrugarh University with effective from academic session 2016-17

COURSE STRUCTURE OF SEMESTER-III:

Sl No	Course Code	Course Title	L	T	P	Contact hrs/wk	Credits
01	BS301	Mathematic-III	3	1	0	4	4
02	PI302	Electrical Network Theory	3	1	0	4	4
03	ET303	Digital Circuits & Logic Design	3	1	0	4	4
04	ET304	Electronic Devices and Circuits	3	1	0	4	4
05	PI305	Transducers and System Components -I	4	0	0	4	4
06	PI 306	Electrical Engineering Materials	3	0	0	3	3
07	ME302	Basic Thermodynamics and Fluid Mechanics	2	0	0	2	2
Practicals							
08	ET303L	Digital Circuits & Logic Design Laboratory	0	0	2	2	1
09	ET304L	Electronic Devices and Circuits Laboratory	0	0	2	2	1
10	PI305L	Transducers and System Components-I Laboratory	0	0	2	2	1
		Total	21	4	6	31	28

Course Structure of BE IV th Sem

01	BS 401	Mathematics-IV	3	1	0	4	4
02	PI 402	Analog Electronics Circuits	3	1	0	4	4
03	ET 403	Signals and Systems	3	1	0	4	4
04	PI404	Transducers and System Components-II	3	1	0	4	4
05	PI 405	Electrical Machines	3	1	0	4	4
06	ET 406	Computer Architecture and Organization	3	0	0	3	3
Practicals /projects							
07	PI402L	Analog Electronics Circuits Laboratory	0	0	2	2	1
08	ET 403L	Signals and Systems Laboratory	0	0	2	2	1
09	PI 404L	Transducers and System Components –II Laboratory	0	0	2	2	1
10	PI 405L	Electrical Machines Laboratory	0	0	2	2	2
		Total	18	5	8	31	28

COURSE STRUCTURE OF SEMESTER-III

MATHEMATIC-III

SEMESTER: THIRD SEMESTER
COURSE CODE : BS301
L:T:P : 3:1:0 Credits:4

VECTOR CALCULUS: Vector functions, variable vectors and preliminaries, differentiation, differential operators, identities, gradient, divergence, curl, their physicals meaning. Line,surface and volume integrals, Gauss, Green and Strokes Theorem. Simple applications of Engineering problems. PARTIAL DIFFERENTIAL EQUATIONS: First order linear equation, Four standard forms of non – linear equation, linear equation with constant coefficient, Solution by separation of variables, Laplace Equ ation, Wave Equation Heat Equation, Solution of boundary value problems.

STATISTICS:
Measure of central tendency (mean, median, mode) Measures of dispersions, variance, moments, skewnes s and Kurtos' theory of probability-addition law, multiplication law, conditional probability, independent events. Theoretical discrete distribution-binomial, Poisson distribution, Normal distribution, method of least square and curve fitting.

GRAPH THEORY: Definition, Directed and undirected graphs, basic terminologies, finite and infinite graph, incidence and degree of vertex, isolated and pendent vertices, null graph, Handshaking the orem, types of graphs, sub graphs, graphs isomorphism,operations of graphs, connected graph, disconnect ed graphs and components. Walk, path and circuits, Eulerian graphs, Hamiltonian graphs, Dirac's theorem, Ore's, theorem, Konigsberg's Bridge problem, Representation of graphs, matrix representation of graph, adjacency matrix, Incidence matrix, Linked representation of graphs. Trees, Spanning trees, Minimal spanning tree

Text Books/ Reference books:

[1] A Text book of Engineering Mathematics by N.P. Bali & Dr. Manish Goyal.
[2] Graph Theory with application to Engineering and computer Science; Narasingh Deo, Prentice Hall of India, New Delhi, 2006. Page 29 of 31
[3] Graph Theory with Application; C. Vasudev, New Age International Publishers.
[4] Fundamentals of Mathematical Statistics; V.K. Kapoor, S.C.Gupta, Sultan Chand & Sons.
[5] Fundamentals of Applied Statistics;V.K. Kapoor, S. C. Gupta, Sultan Chand & Sons TMGH.
[6] Advance Differential Equation; M D Raisinghania, S Chand Company.
[7] Introduction to Partial Differential Equation; K. Sankara Rao, Prentice-Hall of India.
[8] Advance Engineering Mathematics: Erwin Kreysig(Willey)
[9] A text book of vector calculus; Shanti Narayan, J. N. Kapur, S. Chand and Company, N. Delhi.
[10\ Theory and Problems of Vector !nalysis, MurrayR.Spiegel, Schaum's outline series, Mc Graw Hill Book Company.

NETWORK THEORY

SEMESTER:THIRD SEMESTER
COURSE CODE : ET302
L:T:P : 3:1:0 Credits:4

Module 1: Sinuoidal Steady state Analysis : Phasor representatin of sinusoidal functions; Frequency domain diagram; phasor diagram, Node and loop analysis;steady state response using network theorem Superposition, reciprocity, Thevenin's, Nortons, Maximum power Transfer, compensation and Tallegen's theorem; Magnetically coupled circuits; duality.of Network

Module2:Resonance and locus diagrams: Series and parallel resonance - Selectivity - Bandwidth - Q factors –Times circuits. Locus diagrams for RL and RC circuitswith AC excitation for parametric and frequency variations under steady state conditions.

Module 3: Circuit Transients: Concept of Circuit Transients: Transient response amd steady state response; Laplace transforms of various signals of excitation -Waveform synthesis, Laplace transformed networks - Determination and representation of initial conditions- Response for impulse function only and its relation to network admittance - convolution integral and applications. Network Synthesis: Hurwitz polynomial, positive real functions ,reactive networks, seperation property of reactive networks, The fur –reactance function form, specification of reactance function. Foster form of reactive networks Cauer form of reactance networks. Syntheis of R-L and R-C networks in Foster and Cauer forms

Module 4: Two-port network parameters, Interconnection of two port networks, condition of reciprocity and symmetry ;Relation between the parameter sets; equivalent T &II section represantation.Barlett's bisection theorem.Image and Iterative parameters. Design of attenuators.

Module 5:Two port Reactive network(filter):Classification of filters, Characteritic impedance, Contant K-filterm-derived filter. Composite filters. Band pass and Band elimination filters. Problem of termination,Lattice filters, Inroduction to active filters.

Module 6 :Non sinusoidal periodic waves:Periodic waves; Fourier analysis of non- sinusoidal periodic waves;Waveform symetry Frequency spectrum;average value; Root mean quare value Average power of non sinusoidal periodic functions.

Module 7:Graph Theory: Graph of a network and it parts:; Oriented graph; Tree;Co-treeLoop;Tie-sets;Cut set matrix; Incidence matrices; Network equilibrium equations

Reference Book:

1. Valkenberg V., "Network Analysis", 3rd Ed., Prentice Hall International Edition.,2007.
2. Valkenberg V., "Network Synthesis,
3. Kuo F. F., "Network Analysis and Synthesis", 2nd Ed., Wiley India.,2008.
4. Chakraborty A,"Circuit Theory"
5.Roy Chudhury D, "Network and System"

DIGITAL CIRCUITS & LOGIC DESIGN

SEMESTER:THIRD SEMESTER
COURSE CODE : ET303
L:T:P : 3:1:0 Credits:4

Module 1: INTRODUCTION, NUMBER SYSTEMS AND CODES.

Digital Systems; Number Systems: Positional number system- Decimal, binary, octal and hexadecimal number systems and their base conversions; Binary arithmetic- Addition, subtraction, multiplication and division; 1's and 2's complement; Representation of signed numbers; Fixed and floating point numbers; Codes: Binary coded decimal codes, Gray codes, Error detection and correction codes - parity check codes and Hamming code.

Module 2: BOOLEAN ALGEBRA AND LOGIC GATES.

Boolean Algebra: Definition, basic postulates and fundamental theorems of Boolean Algebra; De-Morgan's theorem; Logic Gates: Types, symbols, logic operations and their truth tables; Sum of product(SOP) and product of sum(POS) forms; Canonical forms; minterm and maxterm; Simplification of switching functions – Algebraic and Karnaugh map(K-map) methods; Realization of simplified switching functions using logic gates; Don't-care condition;

Module 3: COMBINATIONAL LOGIC CIRCUITS.

Design of combinational logic circuits; Adders -Half and Full adder, parallel binary adder(ripple carry adder), carry look-ahead adder; Subtractors- Half and Full subtractor; Combined adder/subtractor; ALU; comparators; Parity circuits- Generator and checker; Decoders, encoders, multiplexers, demultiplexers and their applications; Code converters; Design examples.

Module 4: SEQUENTIAL LOGIC CIRCUITS.

Latches; Flip-flops- SR, D, JK, T and Master Slave JK, EDGE Triggered; Registers, Shift-registers- SISO, SIPO, PIPO, PISO, Bidirectional; Counters- Ring counter, Johnson(Twisted ring) counter, ripple(Asynchronous) counter, synchronous counters, up-down counters, timing diagrams and specifications; Clocked sequential circuit: Synchronous circuit analysis and design- Mealy and Moore circuits, transition(excitation) table, state diagram, state table, state reduction, state assignment, Lockout condition; design and analysis of synchronous and asynchronous state machine, concept of race, critical race and hazards,

Module 5: LOGIC FAMILIES

Introduction to different logic families; TTL inverter; CMOS inverter Structure and operations of TTL and CMOS gates; Electrical characteristics of logic gates – logic levels and noise margins, fan-out, propagation delay, transition time, power consumption and power-delay product.

Module 6: MEMORIES.

ROM,PROM,EPROM; RAM- S(Static) RAM and D(Dynamic) RAM; Programmable Logic Devices- PLAs, PALs and their applications; FPGA.

Text/Reference Books:

1. Anand Kumar: Fundamentals of Digital Logic, PHI
2. G.K. Kharate: Digital Electronics, Oxford University Press
3. M. Morris Mano: Digital Logic and Computer Design, PHI
4. J. F. Wakerly: Digital Design, Principles and Practices, Pearson Education
5. Charles H Roth: Digital Systems Design using VHDL, Thomson Learning

ELECTRONIC DEVICES AND CIRCUITS

SEMESTER:THIRD SEMESTER
COURSE CODE : ET304
L:T:P : 3:1:0 Credits:4

Module 1: Semiconductors: Review of Band Theory of solids, intrinsic semiconductors, Generation and Recombination of electrons and holes. Thermal equilibrium, Doped semiconductors n and p types, Fermi level and carrier concentrations of n and p type semiconductors. Carrier mobility and conductivity, diffusion, Mass-action law, continuity equation.

Module 2: P-N Junction Diodes: The open circuited junction, space charge region, the biased p-n junction, the Volt-Ampere characteristics, effect of temperature on V-I characteristics, Breakdown of junctions on reverse bias, Transition and diffusion capacitance of p-n junction diodes, junction diode switching times

Module 3: Diode Circuits: Half wave and Full wave single phase rectifiers and their analysis, peak inverse voltage, various types of filters and their analysis and applications, voltage multiplier circuits, Clipping and Clamping circuit

Module 4: Special purpose diodes: Zener diode, Light Emitting diodes, Photo diodes, Solar cells, Varactor diodes and their applications

Module 5: Bipolar Junction Transistors (BJT): PNP and NPN junction transistors, different configurations of BJT and their input & output characteristics, different modes of operation, the Ebers-Moll representation of BJT, (Early effect), Avalanche breakdown & Punch through, . BJT biasing: The operating Point , DC & AC load lines, different biasing circuits analysis and problems, Stabilization, various stabilization circuits, Thermal runaway and thermal stability, BJT as a switch and amplifier,

Module 6: The Field Effect Transistor (FET): Differences between BJT and FET, the construction and operation of the Junction Field Effect Transistor, the drain and transfer characteristics, MOSFET: construction and operation of Depletion and Enhancement MOSFET, the drain and transfer characteristics, Biasing of FETs, CMOS devices

Module 7: Small Signal low frequency Transistor Amplifier circuits: Transistor hybrid model, Analysis of transistor amplifier circuits using 'h' parameters, Effect of bypass and coupling capacitors on the low frequency response of the amplifier, Emitter follower, FET amplifiers - low frequency and high frequency models, Amplifier configurations, Low and high frequency response of amplifier circuits, Analysis of single stage FET amplifier circuits. Cascaded BJT amplifier, Darlington pair.

Text/Reference Books:

1. *D. A. Neamen, Semiconductor Physics and Devices (IRWIN), Times Mirror High Education Group*
2. *B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi, 1995.*
3. *J. Millman and Halkias, Integrated Electronics, TMH*
4. *R. Boylested and Nashlsky, Electronic Device and Circuits, Pearson*
5. *David Bell, Electronic Devices and Circuits, Oxford University Press*
6. *J. Millman and A. Grabel, Microelectronics, McGraw Hill, International.*
7. *A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.*

ELECTRICAL ENGINEERING MATERIALS

SEMESTER:THIRD SEMESTER
COURSE CODE : PI 306
L:T:P : 3:0:0 Credits:3

1. Crystal Structure of Materials
   Atomic bonding, Crystallinity, Miller Indices, X-ray crystallography, Structural imperfections, Crystal growth.
2. Conductivity of Metals
   Free electron theory of metals, factors affecting electric conductivity of metals, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, Superconductivity.
3. Dielectric Properties of Materials
   Polarization mechanism and dielectric constant, behaviour of polarization under impulse and frequency switching, dielectric loss, spontaneous polarization, Piezoelectric.
4. Magnetic Properties of Materials
   Origin of permanent magnetic dipoles in materials, classification, diamagnetism, paramagnetism, ferrimagnetism, antiferrimagnetism, and ferrimagnetism, magnetostriction.
5. Mechanism of conduction in Semiconductor
   Energy band theory, classification of materials using energy band theory, Hall effect, drift and diffusion current, continuity equation, P-N diode, Volt-Ampere equation and its temperature dependence, display units LED, LCD and monitors, effect of environment on components
6. Electrical Engineering Materials
   Properties and applications of electrical conducting, semiconducting, insulting and magnetic materials, cables, calculation of capacity of cables, charging currents, stress grading and heading of cables,construction and characteristics of HV and EHV cables
7. Processes
   Basic processes used in the manufacturing of integrated circuits such as epitaxy, masking, photolithography, diffusion, oxidation, etching, metallization, scribing wire bounding and encapsulation, induction and dielectric heating, Electron beam welding and cutting

Text/Reference Books:

1. Decker "Electrical Engineering Materials" PHI
2. S. O. Kasap"Principle of Electrical Engineering Materials" MGH.
3. Mahajan. "Principle of Growth and Procesing of Semiconductors"MGH
4. Dhir"Electronic components and Materials and Maintenance"TMH

TRANSDUCERS AND SYSTEM COMPONENTS-I

SEMESTER:THIRD SEMESTER
COURSE CODE : PI305
L:T:P : 4:0:0 Credits:4

1. **Introduction**: Classification of Transducers- Characteristics- Static characteristics – Accuracy, precision, resolution, sensitivity, linearity –Dynamic characteristics – Mathematical model of transducer – Zero, 1st and 2nd order transducers-Response to impulse, step, ramp and sinusoidal inputs–Error analysis-– Statistical methods -Odds and uncertainty-Improvement of signal-to-noise ratio- Calibration methods – Static calibration -Selection of transducers
2. **Resistive transducers**: Potentiometers-RTD-Thermistors- Strain Gauge-Hot wire anemometers and their applications in measurement of pressure, temperature, force, torque, vibration and flow etc.
3. **Capacitive transducers**: Capacitive transducer and types – Air gap and dielectric types and their applications -Capacitor microphone – Frequency response
4. **Piezoelectric transducers**: Piezoelectric crystal and its properties-Working principle- Sensitivity coefficients- Applications.
5. **Thermocouples**: -Laws of thermocouple –Fabrication of industrial thermocouples –Signal conditioning of thermocouple output-Isothermal block reference junctions – Commercial circuits for cold junction compensation-Response of thermocouple –Special techniques for measuring high temperature using thermocouples
6. **Optical transducers**: Photo detectors- LDR, Photo diode, Photo transistor- Photoemissive cell-Photoconductivecell -Photovoltic cells- Radiation and optical pyrometers.
7. **Elastic transducers**: Diaphragms-Metal and corrugated diaphragms- -Capsule-Bourdon tube-Bellows-Dynamic considerations-Applications.
8. **Other transducers**: Hall Effect transducer – Magnetostrictive tranducers- IC temperature sensor- Feed back transducers.

Text/Reference books:

1. Instrument transducers: An introduction to their performance and design – Neubert M.K.P, Clarendon Press.
2. Measurement Systems: Application and Design – Doeblin E.O., McGraw Hill.
3. Transducers and Instrumentation – Murthy D.V.S., PHI. New Delhi.
4. Sensors and Transducers – Patranabis D., Wheeler.
5. Instrumentation, Measurement and Feed Back – Jones B.E., TMH. New Delhi.
6. Instrumentation Devices and Systems – Ranga, Sarma, Mani; TMH.
7. Instrument Engineer's Hand Book (Measurement) - Liptak B.G , CRC Press
8. Instrumentation measurement and Analysis - Nakra, B.C., and Chaudry, K.K.,TMH
9. Principles of Measurement Systems- John P. Bentley, III Edition, Pearson Education

BASIC THERMODYNAMICS AND FLUID MECHANICS

SEMESTER: THIRD SEMESTER
COURSE CODE: ME 102
L:T:P : 2:0:0 , Credits:2

Module1: Basic Concepts of thermodynamics : Thermodynamic equilibrium , quasi- static process , zeroth law, work and heat interactions , first law for a cycle and a process , steady flow processes , second law statements, reversibility, Carnot theorem and its applications, Clausius inequality, entropy principle . Available energy : Availability and irreversibility , Thermodynamic Potentials , Properties of pure substances , Phase equilibrium diagrams, Rankine cycle , reheat and regenerative cycle, properties of ideal gas , stirling and Ericson cycles.

Module 2: Heat Engines : Otto , diesel and dual cycles , Brayton Cycle with regeneration , inter cooling and reheat , Joule- Thomson effect

Module 3:Fundamentals of Fluid Mechanics :

Classification of fluids and their physical properties , Fluid statics , manometers , Pressure on submerged bodies , Ideal fluid - velocity field – stream line , streak line and path line , Continuity equation - Rotational and irrotational flow , stream function and potential function , Euler's equation of motion , Bernoulli's equation and its application . Classification of open channel flows – measurement of discharge using rectangular and V- notches , Dimentional analysis – Reyleigh's method – Buckinghan Theorem and its applications . Laminar flow – Losses – Hagen – Poiseuille equation- Turbulent pipe flow –Friction

Darcy Weisbach equation – Moody's diagram , minor losses – Boundary layer and its basic concepts

Module 4:Fluid Machinery : Centrifugal pumps , Reciprocating pumps , Hydraulic ram , Impulse turbine , Reaction turbine.

Text/ Reference Books:

Text Books :

1. Zemansky , Heat and Thermodynamics , 7th edition , Mc. Graw Hill , New York , 1997
2. Ojha C. S. P. , Berndtsson R. ,Chandramouli P. N. , Fluid Mechanics and Machinery , Oxford Univ. Press , 2010.
3. Streeter V. L. and Wylie E. B. , "Fluid Mechanics" , 9th edition , McGraw Hill, NY, 1997

Reference Books :

1. Van Wylen G. A. , Fundamentals of Classical Thermodynamics , "4th Edition, John Wiley and Sons, 1994.

2. Cengal Y. A. , Bogles M. A. , Micheal Boles , Thermodynamics , 2nd Edition , McGraw Hill Book Company, 1994
3. Nag P. K. , Engineering Thermodynamics , 2nd Edition, Tata McGraw Hill , 1995

4. Crowe C. T. , Elger D. F., Williams B. C. , Roberson J. A., Engineering Fluid Mechanics 9th Edition, John Wiley & Sons, 2009
5. Thermodynamics:John Wiley & Sons.
6. Jones, J. B., & Dugan, R. E. Engineering thermodynamics: Prentice Hall.
7. Potter, M. C., & Somerton, C. W. Schaum's Outline of Thermodynamics for Engineers, McGraw-Hill.

DIGITAL CIRCUITS & LOGIC DESIGN LABORATORY

SEMESTER:THIRD SEMESTER
COURSE CODE : ET303L
L:T:P : 0:0:2 Credits:1

Objectives: The main objective of this course are:

1. To give Introduction to Digital Laboratory Equipments & IC's
2. To study basic logic gates and verify their truth tables.
3. To study sop and pos forms of Boolean function and implement it using logic gates .
4. To study and construct basic flip-flops
5. To study and implement encoder and decoder
6. To study and implement multiplexer
7. To study and implement demultiplexer
8. To study adder, subtractor circuit using a 4-bit adder IC
9. To study and construct of Synchronous Counter
10. To study and construct Asynchronous counter
11. To realize basic gates (AND,OR,NOT) from Universal Gates(NAND & NOR).
12. To study about full adder & verify its truth table.

ELECTRONIC DEVICES AND CIRCUITS LABORATORY

SEMESTER:THIRD SEMESTER
COURSE CODE : ET304L
L:T:P : 0:0:2 , Credit:1

Course objectives:

The main objective of this course is to make the students well versed with basic electronic components and circuits. The objective are

1. To operate the CRO and Function Generator
2. To study and realize the Characteristics of PN junction diode and Zener diode
3. To study Applications of PN junction diode like Rectifiers, Clippers etc.
4. To study and perform experiments for application of Zener diode as voltage regulator
5. To study and realize Characteristics of different configurations of BJT and its usage in applications like amplifiers
6. To study and realize Characteristics of FET

TRANSDUCERS AND SYSTEM COMPONENTS-I LABORATORY

SEMESTER:THIRD SEMESTER
COURSE CODE : PI305L
L:T:P : 0:0:2 , Credit:1

1. Study and use of a direct reading Strain indicator. And apply it as Torque sensor, Proximity sensor etc.
2. Study and use of a i) Potentiometer & ii) LVDT in displacement sensing. Also Weight/Force/Pressure measurement using LVDT.
3. To study input output characteristics of LVDT. To study characteristics of Strain gauge. Measurement of loads using Column type Load Cell & associated circuits.
4. Study and use of flow sensors like V- notch weir, Orifice , Rotameter, Hotwire, Electromagnetic type etc.
5. Study and use of various vibration sensors like strain gauge type, LVDT type, piezoelectric type, semiconducting strain gauge type etc for measuring vibration of a cantilever beam at different frequencies.
6. Familiarization with IC temperature sensors AD590 and setting up a direct temperature indication system.
7. To study &set up and test the performance of a direct reading temperature indicator using thermocouple.
8. To study & set up and test the performance of a direct reading temperature indicator using RTD.
9. To study & set up and test the performance of a direct reading speed sensing scheme using: Magnetic pick up& Photoelectric pick up unit.

10. To study & set up a displacement sensing scheme using LDR unit.
11. To study and test a variable inductance transducer.
12. To determine I/O characteristics of Hall Effect Transducer/ Rotary Potentiometer etc.
13. Level measurement using Capacitive transducer.
14. To study the transient response analysis of RLC circuit

COURSE STRUCTURE OF SEMESTER-IV

MATHEMATICS-IV

SEMESTER: FOURTH SEMESTER
COURSE CODE: BS401
L:T:P : 3:1:0, Credits:4

Module 1: SERIES SOLUTION: Series Solution of ordinary differential equation. Bessel's equation, Bessel's function, Legendre Polynomials.

Module 2: FUZZY MATHEMATICS:
Introduction to fuzzy set theory: Crisp set and Fuzzy set, Types of fuzzy sets, some basic definitions, Uni on and intersection of fuzzy sets. Operations on fuzzy sets: Some important theorems, Decomposition the orems, Fuzzy numbers and arithmetic: Fuzzy numbers, triangular fuzzy numbers, Trapezoidal fuzzy num bers, Fuzzy Arithmetic, Arithmetic operation on fuzzy numbers, Fuzzy Equations. Fuzzy Relations: Fuzz y relation and basic definition, Equivalent fuzzy relations, Composition of fuzzy relation (MAX-MIN operation, MAX PRODUCT composition and MAX AVERAGE composition) Fuzzy systems and Fuzzy controlling:Fuzzy rule based system, Fuzzification and Defuzzification (Centre of Are a Method, Centre of Sums method, Mean of Maxima Method, Centre of maxima method, weighted avera ge Method) Fuzzy Control, Assumption and Design of fuzzy controllers, some examples (Air conditioner controller, Aircraft Landing Control Problem), Fuzzy Neural networks.

Module 3: TENSOR ANALYSIS:
Introduction: Summation convention, Transformation of coordinates.
Tensor of order zero. Kronecker delta, contravariant and covariant vectors, contravariant and covariant te nsors of order two. Symmetric and skew symmetric tensors, addition of tensors, outer product and inner p roduct of tensors. Quotient law, Riemamnnian space, metric tensor, conjugate tensor, Christoffel symbols , Transformation of Christoffel symbols.

Module 4: LINEAR PROGRAMMING PROBLEM:
LP Model Formulation and Graphical method, Feasible solution, Basic solution of a Linear Programming Problem, Theory of Simplex Algorithm and simplex method; Standard form of an L P Problem; Complim entary slackness theorem, Degeneracy; Fundamental theorem of Duality, Cycling, Transportation Proble m, Elements of Dynamic Programming problem.

Text Books/ Reference books:

1. Advance Differential Equation; M D Raisinghania, S Chand Company.
2.Fuzzy Sets and Fuzzy Logic, Theory and Applications. (George J.Klir and Bo Yuan)
3. Fuzzy Set Theory and its application (H. J. Zimarmen, Boston)
4. Fuzzy Sets and Their Application (Dr. Sudhir K. Pundir and Dr. Rimple Pundir)
5.A Text Book of Engg. Math.: By N.P. Bali & Dr. Manish Goyal(Laxmi Publication).
6. Linear Programming and Theory of Game; P. M. Karak, New Central Book Agency(P) Ltd.
7. Linear Programming and Game Theory; Dipak Chatterjee, Prentice Hall of India (P) Ltd.
8. Linear Programming; G. Hadley, Narosa Publishing House.
9. Vector Analysis and an Introduction to Tensor Analysis(Schaum Outline Series) by M. R. Spiegel.

ANALOG ELECTRONICS CIRCUITS

SEMESTER: FOURTH SEMESTER
COURSE CODE: PI402
L:T:P : 3:1:0 , Credits:4

Module 1: INTRODUCTION: Scope and applications of analog electronic circuits. Amplifier m odels: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Procedure for particular specifications

Module 2: MULTISTAGE AMPLIFIERS: Classification of amplifiers, Distortion in amplifiers, Frequency response of an Amplifier, Bode plots, Step response of an amplifier, Analysis of Multistage amplifier, Design of two stage amplifier, Common Source and Common Drain amplifier at high frequencies, Frequency response of cascaded stages, Cascode amplifiers (CE-CB),The effect of coupling and bypass capacitors, RC coupled amplifier and its low frequency response Differential amplifiers, Analysis of Differential amplifiers

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Module3: FEEDBACK AMPLIFIERS: Classification and representation of amplifiers, Feedback concept, The transfer gain with feedback, General characteristics of negative feedback amplifiers. Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

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Module4: OSCILLATORS: Sinusoidal oscillators, Barkhausen Criterion, Analysis and design of RC phase shift (FET/ BJT) oscillator, Wien bridge oscillators, Resonant circuit oscillators, General form of oscillator circuit (Hartley & Colpitts), Crystal oscillators, non-sinusoidal oscillators.

Module5 : High Input Impedance and Power Amplifier: Need for High input impedance amplifier, Emitter Follower, Darlington Amplifier, Tuned amplifier, Class-A, ClassB, Class-AB and Class _C amplifiers, Distortions in power amplifiers

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Module 6: TUNED AMPLIFIER: Design and analysis of single tuned amplifier circuit with a capacitor coupled load, Double tuned inter-stage design. Stability consideration, Class B and class C tuned power

Module 7: BASIC POWER ELECTRONICS : Thyristor , Converter, Inverter ,Chopper, basics of power electronic drives.

Text/Reference Books:

1. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.

2. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.

3. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, Edition IV

4. Paul R.Gray \& Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition McGraw Hill, 1992.

5. Power Electronics , P S Bhimra, Dhanpat Rai Publications

SIGNALS AND SYSTEMS

SEMESTER: FOURTH SEMESTER
COURSE CODE :ET403
L:T:P : 3:1:0, Credits:4

Module 1: Signals: Signals and their Examples; Signal classifications: continuous time and discrete time signals- Deterministic and non deterministic, periodic and non periodic, even and odd, energy and power signals; Elementary signals: unit step, unit impulse, unit ramp, the sinusoid, the complex exponential; Basic operations: Time shifting, time scaling, time reversal, amplitude scaling, signal addition, signal multiplication.

Module 2: Systems: Systems and their Examples; System classifications: continuous time and discrete time systems- static and dynamic, causal and non causal, linear and non linear, time invariant and time variant, stable and unstable, invertible and non invertible systems; Linear Time Invariant (LTI) systems and their properties.

Module 3: Fourier Series Representation Of Periodic Signals: Fourier series representation of periodic signals- Trigonometric Form, cosine form and exponential form; Fourier spectrum- amplitude and phase spectra; Properties of Fourier Series.

Module 4: LTI - Continuous Time Systems: Fourier transforms; magnitude and phase representation of CTFT; existence of Fourier transforms; CTFT of standard signals; Properties of CTFT; CTFT of signals; Inverse CTFT; system representation by differential equation; system analysis with CTFT.
Laplace transforms- unilateral and bilateral; Region of Convergence (ROC); existence of LT; unilateral LT of some commonly used signals; Properties and theorems of LT; Inverse LT; system representation by differential equation; System analysis with LT.

Module 5: Sampling: Sampling theorem; Nyquist rate; Effect of under sampling- Aliasing; Anti-Aliasing filter; Sampling techniques- Impulse sampling, Natural sampling, Flat Top sampling; Data reconstruction- Ideal reconstruction filter, Zero order hold, Transfer function of a zero order hold

Module 6: LTI - Discrete Time Systems: Z-Transformation; ZT of some commonly used sequences; ZT and ROC of finite duration sequences; Properties of ROC; Properties and theorems of ZT; Inverse ZT; system representation by difference equation; System analysis with ZT.

Text/ Reference:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young: Signals and Systems, PHI
2. A.Anand Kumar: Signals and Systems, EEE
3. B. P. Lathi: Signal Processing and Linear Systems, Oxford University Press
4. Douglas K. Lindner: Introduction to Signals and Systems, McGraw-Hill International Edition
5. Simon Haykin, Barry van Veen: Signals and Systems, John Wiley and Sons (Asia) Private Limite

TRANSDUCERS AND SYSTEM COMPONENTS-II

SEMESTER: FOURTH SEMESTER
COURSE CODE : PI404
L:T:P : 3:1:0 , Credit:4

1. **Inductive transducers**: Variable reluctance transducers – Principle of operation, construction details, characteristics and application of LVDT- Principle of operation, construction details, characteristics and application of Synchros - Phase sensitive detector-Push-pull arrangement.
2. **D.C and A.C Servo Motors** : Construction, working principle, torque equation, transfer functions and applications of d.c and a,c servo motors , effect of load variation
3. **Stepper Motors** : Classification- Construction – Principle of operation -Torque equation - Driver circuits –Applications; Driver Circuits , Logic Translator applications.
4. **Special Transducers** : D.C & A.C Techogenerators –Construction, Principle of operation, characteristics and applications. Digital transducers- Shaft encoders; Sources of noise and their reduction, Grounding and shielding techniques. Ultrasonic transducers and their applications.
5. **Pneumatic and Hydraulic components** – Introduction, power supply, air filter, pressure regulator, Relay, Amplifier, Controllers & Recorders, Introduction to fluidic devices,Flapper Nozzle, Electropneumatic transducers- I to P and P to I Converters, Pneumatic control valve, Pneumatic P, P-I, P-D and P-I-D Controllers. Hydraulic actuator, Hydraulic servo valves and their applications.
6. **Other Sensors:** Introduction to **-** Smart sensors - Fibre optic sensors- SQUID sensors-Film sensors-MEMS – NANO sensors
7. **Signal Amplification and Transmission**: Instrumentation amplifiers, Logarithmic amplifiers and their applications. 4-20mA current loop; Serial data communication using RS232 and RS485 based system, Distributed measurement system, IEEE488 protocol

Text / Reference books:

1. Instrument transducers: An introduction to their performance and design – Neubert M.K.P, Clarendon Press.
2. Measurement Systems: Application and Design – Doeblin E.O., McGraw Hill.
3. Transducers and Instrumentation – Murthy D.V.S., PHI. New Delhi.
4. Sensors and Transducers – Patranabis D., Wheeler.

5. Instrumentation, Measurement and Feed Back – Jones B.E., TMH. New Delhi.
6. Instrumentation Devices and Systems – Ranga, Sarma, Mani; TMH.
7. Instrument Engineer's Hand Book (Measurement) - Liptak B.G , CRC Press
8. Fractional H.P Electrical Machines - Armensky E.V & Falk G.B – (Mir Publishers)
9. Instrumentation measurement and Analysis - Nakra, B.C., and Chaudry, K.K.,TMH
10. Principles of Measurement Systems- John P. Bentley, III Edition, Pearson Education.

COMPUTER ARCHITECTURE AND ORGANIZATION

SEMESTER: FOURTH SEMESTER
COURSE CODE : ET406
L:T:P : 4:0:0, Credit:4

Module1 : The Computer System: Computer interconnection structure - Computer components Functions, interconnection structures. Performance of a computer,Memory organization- Internal and external memory - Overview of computer memory Systems, Semiconductor main memory, virtual memory concept, cache memory, Improving cache performance ,magnetic disc, magnetic tape, large storage memories. Operating System - Operating Systems Overview, Scheduling and memory management.

Module 2: The Central Processing Unit: Computer arithmetic, ALU, integer and floating point numbers representations and arithmetic. Instruction Sets - Machine instruction characteristics - types of operands and Operations, addressing modes – Instruction set architectures, CISCand RISC architectures, Super scalar Architectures.

Module 3: The Control Unit: Control Unit Operation - Micro Operations, Control of the CPU, hardware implementation. Micro programmed control - Sequencing and execution of Micro instructions, bit slice architecture, applications. Recent Trends in Computer Systems: Parallel organization - Multiprocessing, Vector Computation, Faulty tolerant Systems.

Module 4: I/O Organization: Accessing I/O devices, Input/output programming, Interrupts, Exception Handling, DMA, Buses, I/O interfaces-Serial port, Parallel port, PCI bus, SCSI bus, USB bus, Firewall and Infini band, I/O peripherals.

Text Books/ Reference:

1. Computer Organization and Design, by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
2. Computer Architecture and Organization, 3rd Ed., by John P. Hayes, TMH.
1. Operating Systems Internals and Design Principles by William Stalling, Prentice Hall.
2. Computer Organization 5th Ed., by Carl Hamacher, Zvonko Vranesic, 2002, Safwat Zaky.
3. Mano M.M., Computer System Architecture, PHI (EEE).
4. Structured Computer Organization by A.S. Tanenbaum, 4th Ed., PHI. .

ELECTRICAL MACHINES

SEMESTER: FOURTH SEMESTER
COURSE CODE: PI 405
L:T:P : 3:1:0 , Credit:4

Module 1: **DC Generator**: Construction and principle of operation, armature winding, armature reaction and commutation, interpoles and compensating winding, E.M.F. equation, classification, charateristics and uses, losses and efficiencies, condition of maximum efficiency.

Module 2: D.C. motor: Principle of operation, classification, characteristics and uses, losses and efficiency, condition for maximum power output, starting and speed control.

Module 3: Transformer: Construction and core type, shell type and berry type transformers, classification, working principle, e.m.f. equation, phaor diagram, leakage reactance, equivalent circuits, voltage regulation, losses and efficiency, open circuit and short circuit tests, all day effiency.

Module 4: Pollyphase induction motor:Construction ,type of induction motor, principle of operation, equivalent circuit, torque equation, slip-toeque curves, losses and efficiency, condition of maximum torque, no load and blocked rotor tests, methods of starting and speed control.

Module 5: Synchronous Machines: Construction, classification, working principle, armature winding and winding factors, e.m.f. equation, armature reaction, synchronous reaction and impedance, phaor diagram, open circuit and short circuit tests, voltage regulation by synchronous impedance method,
Synchronous motor- principle of operation, V-curve, vector diagram, starting methods, Hunting, Application of Synchronous converter.

Module 6: Single phase inductin motor: Construction, Principle of operation on the basis of double revolving field theory, charateristics, types of starting methods

Module 7: Special Machines : Shades pole motor, universal motor, repulsion type motor, Hysteresis type motor, Stepper motor.

Texts

1. Stephen Chapman, Electric Machinery Fundamentals, McGraw-Hill, 4/e, 2003.
2. R. K. Rajput, Electrical Machines, 3/e, Laxmi Publications (P) Ltd., 2003.
3. Cotton,H., "Advanced Electrical Technology", CBS Publishers and Distributors, New Delhi, 1984.
4. Nagrath I.J. and Kothari, D.P., "Electrical Machines", TMH, New Delhi, 2001.
5. Yamayee,Z.A and Bala, JL, Electromechanical Energy Devices an Power Systems, John Wiley & Sons Inc., 1994

References

1. I. L. Kosow, Electrical Machinery and Transformers, 2/e, Prentice- Hall of India Pvt. Ltd., 2003.

2. B. S. Guru and H. R. Hiziroglu, Electrical Machinery and Transformers, 3/e, Oxford University Press, 2003

ANALOG ELECTRONICS CIRCUITS LABORATORY

SEMESTER: FOURTH SEMESTER
COURSE CODE : PI402L
L:T:P : 0:0:2 ,Credit:1

Objectives:

The main objective of this course are:

1.To learn Voltage gain and frequency response of RC coupled amplifier

2. To learn Oscillators(e g. Hartly, Colpits, wein bridge oscillators)

3. To lear power amplifiers(Class A,B, C)

4. To learn differential amplifier

5. To learn Choppers, Inverters, Thyristors

SIGNALS AND SYSTEMS LABORATORY

SEMESTER: FOURTH SEMESTER
COURSE CODE : ET403L
L:T:P : 0:0:2, Credit:1

Objectives: The main objective of this course are:

1.To Introduce students to MATLAB
2. To study the continuous and discrete time signals using MATLAB
3. To study the continuous and discrete time systems using MATLAB
4. To study the Fourier series using MATLAB
5. To study the Fourier transforms using MATLAB
6. To study the Convolution of signals using MATLAB
7. To study the Laplace transforms using MATLAB
8. To study the Z-transforms using MATLAB
9. To study the sampling using MATLAB

ELECTRICAL MACHINES LABORATORY

SEMESTER: FOURTH SEMESTER
COURSE CODE : PI405L
L:T:P : 0:0:2, Credit:1

Contents

1 To obtain the speed characteristics of a D.C shunt motor as a function of armature voltage, field current, and external resistance in the armature circuit.
2 To obtain the performance characteristics of a DC shunt motor by load test.
3 To plot O.C.C. and find the critical resistance (Rc) and critical speed (Nc) of a dc shunt generator
4 To conduct a load test on a dc shunt generator and obtain its internal and external characteristics.
5 O.C & S.C tests of single phase transformer
6 Load test of single phase transformer
7 Measurement of three phase power
8 O.C & S.C. test of alternator

TRANSDUCRS AND SYSTEM COMONENTS-II LABORATORY

SEMESTER: FOURTH SEMESTER
COURSE CODE : PI404L
L:T:P : 0:0:2 , Credits:1

Experiment No.1 Study of input output characteristics of LVDT and Determine Sensitivity.

Experiment No. 2 Study of Linearity from input output Characteristics of LVDT

Experiment No. 3 Study of phase difference between LVDT secondaries.

Experiment No.4 Study of torque-synchro pair operation

Experiment No. 5 Study of error detection operation

Experiment no. 6. To study the synchro transmitter characteristics

Experiment no. 7 Study of strain measurement using strain gauge and cantilever assembly.

Experiment no. 8 To study a Proportional Controller

Experiment no. 9 Study of integrator Controller

Experiment no. 10 Study of Proportional Integrator (PI) Controller

Experiment. No.11 Study the PID Controller.

Experiment no. 12 To draw the I/P-O/P Curve of rotational Potentiometer and to determine sensitivity.