Punjab Technical University

Jalandhar

Syllabus Scheme

For

Bachelor of Technology in

Electrical Engineering

For 2002 Batch

PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

SCHEME OF TEACHING FOR

B. TECH IN ELECTRICAL ENGINEERING

SEMESTER-III

COURSE NO.	**SUBJECT**	**L**	**T**	**P**	**MARKS INT.**	**Marks EXT.**	**TOTAL MARKS**	**DURATION OF EXAM. HRS.**
AM-201	Applied Mathematics - III	4	1	-	40	60	100	3
EE-201	Network Analysis & Synthesis	3	2	-	40	60	100	3
EE-203	Magnetic Circuits & Transformers	3	1	-	40	60	100	3
EE-205	Electrical Measurements & Measuring Instruments	3	1	-	40	60	100	3
CS-252	Object Oriented Programming	3	1	-	40	60	100	3
EE-207	Electronic Devices & Circuits	3	1	-	40	60	100	3
EE-209	Lab - I (Electronic Devices & Networks)	-	-	2	30	20	50	3
EE-211	Lab - II (Electrical Measurement & Measuring Instruments)	-	-	2	30	20	50	3
CS-254	Lab - III (Object Oriented Programming)	-	-	3	30	20	50	3
EE-213	Electrical Workshop Training*	-	-	-	60	40	100	-
Total		19	7	7	390	460	850	

***** Students will undergo 4 weeks workshop training in the electrical shop (related to electrical wiring, transformer & motor winding etc.) during summer vacations after second semester.

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SEMESTER-IV

COURSE NO.	SUBJECT	L	T	P	Marks INT	Marks EXT.	TOTAL MARKS	DURATION OF EXAM. HRS.
EE-202	Electromechanical Energy Conversation & DC Machines	3	1	-	40	60	100	3
IC-204	Linear Control Systems	3	2	-	40	60	100	3
EE-204	Applied Electronics	3	1	-	40	60	100	3
EE-206	Instrumentation Engg.	3	1	-	40	60	100	3
EC-204	Digital Electronics	3	1	-	40	60	100	3
EE-208	Electrical Engg. Materials	3	-	-	40	60	100	3
EC-210	Lab –IV (Applied Electronics Lab)	-	-	2	30	20	50	3
EC-212	Lab-V(Digital Electronics Lab)	-	-	2	30	20	50	3
EE-210	Lab -VI (Control and Instrumentation Lab)	-	-	2	30	20	50	3
EE-212	Lab-VII (Electric Machines-I Lab)	-	-	2	30	20	50	3
	General Fitness	-	-	-	100	-	100	
Total		18	6	8	460	440	900	

There should be industrial/institutional training of 6 weeks duration in the summer vacation after 4th semester

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SEMESTER-V

COURSE NO.	SUBJECT	L	T	P	MARKS INT.	MARKS EXT.	TOTAL MARKS	DURATION OF EXAM. HRS.
EE-301	Asynchronous Machines	3	1	-	40	60	100	3
EE-303	Electromagnetic Field Theory	3	1	-	40	60	100	3
EE-305	Power system-I (Transmission & Distribution)	3	1	-	40	60	100	3
EE-307	Microprocessors and Interfacing	3	1	-	40	60	100	3
EE-309	Power Electronics	3	1	-	40	60	100	3
EE-311/ AM-351	Numerical Analysis	3	1	-	40	60	100	3
EE-313	Lab-VIII (Microprocessor Lab.)	-	-	2	30	20	50	3
EE-315	Lab -IX (Power Electronics Lab)	-	-	2	30	20	50	3
EE-317 AM-353	Lab- X (Numerical Analysis Lab)	-	-	2	30	20	50	3
EE-319	Lab-XI (Control Systems Using MATLAB)	-	-	2	30	20	50	3
	Institutional training				60	40	100	
Total		18	6	8	420	480	900	

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SEMESTER-VI/VII

COURSE NO.	SUBJECT	L	T	P	MARKS INT.	MARKS EXT.	TOTAL MARKS	DURATION OF EXAM. HRS.
EE-302	Synchronous Machines	3	1	-	40	60	100	3
EE-304	Electric Drives & Utilization	3	1	-	40	60	100	3
EE-306	Power system-II (Switchgear & Protection)	3	1	-	40	60	100	3
CE-216	Environmental science	3	1	-	40	60	100	3
ME-352	Power Plant Engg.	3	1	-	40	60	100	3
-	Open Elective	3	1	-	40	60	100	3
EE-308	Lab -XII (Electrical Machines-II lab)	-	-	2	30	20	50	3
EE-310	Lab XIII (Software Lab. Visual Basic Programming)	-	-	2	30	20	50	3
EE-312	Lab-XIV (Power Systems II Lab.)	-	-	2	30	20	50	3
EE-314	Minor project)	-	-	2	60	40	100	3
	General Fitness	-	-	-	100	-	100	-
Total		18	6	8			950	

List of open electives:

1. CS –304 Introduction to Business Systems
2. EI-304/403 Industrial Measurements
3. CH-304 Optimization Techniques
4. ME-251 Total Quality Management
5. HU- 251 Human resource Management

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SEMESTER-VI/VII

COURSE NO.	SUBJECT	L	T	P	MARKS INT.	MARKS EXT.	TOTAL MARKS	DURATION OF EXAM. HRS.
	Industrial Training (6 months)	-	-	-	500	500	1000	

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SEMESTER-VIII

COURSE NO.	SUBJECT	L	T	P	MARKS INT.	MARKS EXT.	TOTAL MARKS	DURATION OF EXAM. HRS.
EE-402	Computer Aided Power System Analysis	3	1	-	40	60	100	3
EE-404	Non-linear and Digital Control Systems	3	1	-	40	60	100	3
EE-406	Generation of Electric Power	3	1	-	40	60	100	3
--	Elective –I	3	1	-	40	60	100	3
--	Elective –II	3	1	-	40	60	100	3
EE-408	Lab-XV.(CAPSA Lab)	-	-	2	30	20	50	3
EE-410	Lab-XVI (Power System Design)	-	-	2	30	20	50	3
EE-412	Seminar	-	-	2	100	-	100	-
EE-414	Project Work	-	-	6	100	100	200	3
	General Fitness	-	-	-	100	-	100	-
Total		15	5	12	560	440	1000	-

List of Electives -I

1. EE-416 Extra High Voltage Engg.
2. EE-418 Non Conventional Energy Sources.
3. EE-420 Entrepreneurship
4. EE-422 System Engg.& Reliability.
5. EE-424 Biomedical Engg.
6. EE-426 Communication Engg.
7. EE-428 Industrial Automation and PLCs
8. EE-430 Electrical Machine Design

List of Electives-II

1. CS-201 Computer Architecture
2. CS-202 Operating Systems
3. CS-303 Computer Networks
4. CS-305 Database Management Systems.
5. CS-308 Software Engg.
6. CS-309 Computer Graphics
7. CS-452 Fuzzy Logics & Systems
8. CS-454 Neural Networks

AM 201 APPLIED MATHEMATICS-III

Internal Marks: 40 **L T P**
External Marks: 60 **4 1 0**
Total Marks: 100

1. Fourier Series Periodic functions, Euler's formula. Even and odd functions, half range expansions, Fourier series of different wave forms.

2. Laplace Transforms Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform of unit step function, impulse function, periodic functions, applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

3. Special Functions Power series solution of differential equations, Frobenius method, Legendre's equation, Legendre polynomial, Bessel's equation, Bessel functions of the first and second kind. Recurrence relations, equations reducible to Bessel's equation, Error function and its properties.

4. Partial Differential Equations Formation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients Applications: Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation, solution by the method of separation of variables. Laplacian in polar coordinates.

5. Functions of Complex Variable Limits, continuity, derivative of complex functions, analytic function, Cauchy-Riemann equation, conjugate functions, harmonic functions; Conformal Mapping: Mapping of a complex function, conformal mapping, standard transforms, mapping of standard elementary transformations, complex potential, applications to fluid flow problems; Complex Integration : Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral formula and derivatives of analytic function. Taylor's and Laurent's expansions, singular points, poles, residue, complex integration using the method of residues, evaluation of real integrals by contour integration.

Books

Advanced Engineering Mathematics by Kreyszing Erwin ; Wiley Eastern, New Delhi

Higher Engineering Mathematics by BS Grewal : Khanna Publishers, New Delhi.

Numerical Solutions of Differential Equations by NK Jain ; Prentice Hall, Delhi.

Differential Equations by Sharma and Gupta ; Krishna Prakashan Media (P) Ltd., Meerut.

EE-201 NETWORK ANALYSIS AND SYNTHESIS

Internal Marks: 40 **L T P**
External Marks: 60 **3 2 0**
Total Marks: 100

Circuits Concepts : Circuits elements,

Independent and dependent sources, signals and wave forms; periodic and singularity voltages, step, ramp, impulse, Doublet. Loop currents and loop equations, node voltage and node equations, Network Theorems, Superposition, Thevenin's, Nortan's, Maximum Power Transfer, Reciprocity.

Time and Frequency Domain Analysis :

Representation of basic circuits in terms of generalised freq. & their response, Laplace transform of shifted functions, transient & steady response. Time domain behaviors from poles and zeros. Convolution Theorem.

Network Synthesis :

Network functions, Impedance & Admittance function, Transfer functions, Relationship between transfer and impulse response, poles and zeros and restrictions, Network function for two terminal pair network. Sinusoidal network in terms of poles & zeros. Real liability condition for impedance synthesis of RL & RC circuits. Network synthesis techniques for 2-terminal network, Foster and Cauer forms.

Filters Synthesis :

Classification of filters, characteristics impedance and propagation constant of pure reactive network, Ladder network, T section, IT section, terminating half section. Pass bands and stop bands. Design of constant-K, m-derived filters. Composite filters.

Books:

1. Network Analysis & Synthesis by Van Valkenberg
2. Network Analysis and Synthesis by Sudhakar Sham Mohan
3. Network Synthesis by IVS Iyer
4. Electric Circuits by JA Administer
5. Circuit Theory by Chakraborty

EE-203 MAGNETIC CIRCUITS & TRANSFORMERS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1**. ELECTROMAGNETISM:**
Review of electromagnetism, Magnetic field strength, Magnetic force.

2. **MAGNETIC CIRCUITS**:
Magneto motive force , reluctance, laws of magnetic circuits , determination of ampere-turns for series and parallel magnetic circuits , magnetic leakage and fringing, hysteresis and eddy current losses.

3. **ELECTROMAGNETIC INDUCTION:**
Faraday's laws, Lenz's law, statically and dynamically induced E.M.F., Energy stored in magnetic field.

4**. TRANSFORMERS:**
Introduction, Principle of working, construction of single phase transformer, EMF equation, phasor diagram on no-load, leakage reactance, transformer on load, equivalent circuit, voltage regulation, power and energy efficiency, open circuit and short circuit tests, equivalent circuit parameters estimation.
Effect of saturation on exciting current, in-rush current phenomenon.
Parallel operation of single phase transformer.

5. **AUTO TRANSFORMER:**
Principle of operation, comparison with two winding transformers.

6. **THREE-PHASE TRANSFORMERS:**
Different winding connections, Voltage and current ratios, comparative features, effect of connections on exciting current,
Parallel operation.
Three winding transformer-equivalent circuit, off-load and on-load tap changing transformer, Scott connections.

Recommended Books :

1. Electric Machinery ----Fitzgerald, Kingsley & Kusko (Mcgraw Hill)
2. Transformer Engineering---- L.F. Blume
3. Performance design & Testing of A.C. Machines ---- M.G. Say (CBS, Delhi)
4. Magnetic Circuits and Transformers---- MIT staff
5. Electrical Machines---- Nagrath & Kothari (TMH)
6. Theory of Alternating Current Machines ---- A.S. Langsdorf(TMH)

EE-205 ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1.Units, Dimensions and Standards:
Introduction to MKS & Rationalised MKSA System, SI Units, Standards of EMF, Resistance, Capacitance and Inductance, Systematic errors

2. General Theory of Analog Measuring Instruments:
Operating torque, damping & controlling torque, T/W ratio, Pointers & Scales. Principles of operation of various types of electro mechanical indicating / registering instruments viz. PMMC, dynamometer, induction, thermal, etc. for dc & ac measurement of V,I, W, frequency, phase & power factor etc., energy meter, their sources of error & compensation, shunts & multipliers, multi- meter.

3. Potentiometers:
Basic Potentiometer circuit, multiple range potentiometers, constructional details of potentiometers, applications of d-c potentiometers; self balancing potentiometers.
A-C potentiometers, polar and co- ordinate types.

4. Bridges:
Sources and Detectors, General equation for bridge balance, Measurement of R,L,C,M, F etc by Wheatstone, Kelvin, Maxwell, Hay's, Anderson, Owen, Heaviside, Campbell, schering, Wien bridges.
Bridge sensitivity. Errors, , Wagner Earthing Device.

5. Magnetic Measurements:
Flux meter, B-H Curve, Hystersis loop, Permeameters, AC Testing of Magnetic materials, Separation of iron losses, iron loss measurement by Wattmeter and Bridge methods.

6. Instrument Transformers:
Theory and construction of current and potential transformers, ratio and phase angle errors and their minimization, Characteristics of CTs. & PTs., Testing of CTS & PTS.

BOOKS RECOMMENDED

1.A Course in Electrical & Electronics Measurement & Inst. By. A. K. Sawhney, Dhanpat Rai & sons.

2.Electronic Inst. & Measurement techniques. By W.D. Cooper.

CS -252 OBJECT ORIENTED PROGRAMMING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Basics of C & C++

Introduction, Basics, Data Type, Bit Field integer, Operations, Control Structures, Storage Classes, User Defined Data Type, Reserved Words and Standard 110 Statements in C & C++.

2. Object Orient Programming With C++

Introduction, Object Oriented Programming Concept, Objective of OPP, Programming Structure in C++, Data Abstraction

3. Overloading and Information Hiding

Introduction, Function Overloading, Information Hiding

4. Memory Management in C++:

Introduction, Constructor-Automatic Initialization of Objects, Dynamic Memory Management, Default Constructor, Copy Constructor, Constructor and Information Hiding, Destructor-Automatic Clear up of an Object

5. Inheritance

Introduction, Inheritance-Data and Code Sharing , Class Derivation ,Ambiguity in Class Member Access ,Virtual Base Class-A Remedy , Class Initialization in Inheritance ,Arguments for the Base Class

6. Bindings and Polymorphism
Introduction , Bindings in C++, Polymorphism

7. Generic Facility

Introduction, Concept of Generic Facility, Generic Function ,Overloading a Generic Function, Generic Classes

8. File Handling in C++

Introduction, Concept of Stream in C++, File Positioning Functions , Error Handling During File Operation

EE-207 ELECTRONIC DEVICES AND CIRCUITS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Semiconductor Physics :
Energy Band Theory of crystals, Insulators, Semiconductor, metals, Types of semiconductors, mobility and conductivity, charge densities in Semiconductors, Electrical properties of Ge and Si, Hair effect, generation and recombination of electrons and holes, diffusion, Continuity equation, Injected minority carrier charges, Mass Action Law.

2. Junction Diode Characteristics :
Open circuited P-N junction as rectifier (forward .and.. reverse biasing) current components in P-N diode, V-I characteristics, Space charge and diffusion.capacitance, Junction diode switching times, Breakdown diodes, Tunnel diode, LED, LDC, photo diode, varactor diode. Reverse recovery diode, Schottky diode, Fermi level in intrinsic and extrinsic semiconductor, Band structure of an P-N junction, Basic Semi-conductor equations.

3. Diode Circuits:
Diode as circuit element, Load Line concept, Clippers and Clampers, rectifiers other full wave rectifiers, Capacitive filters, Choke input filter L- C filter, filter, diode circuits for OR, AND (both positive and negative logic).

4. Transistor Characteristics:
Junction transistor, transistor current component, CB, CE, CC configurations, comparison of the configurations, transistor as an amplifier, Photo transistor, Junction FET, JFET Characteristics, Pinch - off voltage Vp diode and transistor circuit for NOT gate.

5. Transistor Biasing and Thermal Stabilization:
Operating point, Selection of Operating points, Different Techniques, Self bias, collector to Base Bias, Emitter bias, divider circuit, Bias compensation, Thermistor and compensation, Thermal runaway and thermal stability.

6. Feedback Amplifiers:
Classification of amplifiers, Feedback concept, positive and negative feedback, General characteristics of negative feedback, Details of voltage series, voltage shunt, current series and current shunt feedbacks, concept of oscillators.

7. Operational Amplifiers:
Basic OP-AMP, Differential amplifier, Emitter coupled Differential Amplifier, transfer characteristics of differential OP-AMP, IC operational Amplifier, Offset error voltage and currents, Temperature drift of input offset voltage and current.

BOOKS RECOMMENDED

1.Integrated Electronics - Jacob Millman & T.M.H.
2.Analog and digital circuits And systems Christos C. Halkias
3. Electronic Principles (6th edition) Albert Paul Malvino T.M.H.
4.OP-AMPS and Linear Integrated Circuits Ramakant A. Gayakwad PHI

EE-209 LAB-I (ELECTRONIC DEVICES AND NETWORKS)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

1. To study V-I characteristics of PN junction diode (Ge, Si, switching and signal).
2. To study Half wave, full wave and Bridge Rectifier.
3. To study transistor characteristics in common base and common emitter configurations.
4. To study the FET characteristics.
5. To design, study and compare various transistor biasing techniques.
6. To study of an emitter follower circuit.
7. To study and compare the frequency response of single stage and two stage RC coupled amplifier.
8. To study the effect of negative feedback on the behavior of amplifiers.
9. To study the frequency response of an amplifier and compute gain bandwidth product.
10. To find Offset Voltage, Gain, CMRR of an Op-amp and study techniques of \ Offset null adjustment.
11. To verify Superposition, Thevenin, Norton and maximum power transfer theorems.
12. To study the response of constant K-filters.
13. To study the response of m-derived filters
14. To study various voltage and current feedback schemes.
15. Diode clippers and clampers.

EE-211 Lab II

(ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTATIONS LAB.)

Internal Marks: 30
External Marks: 20
Total Marks: 50

L	T	P
0	0	2

List of experiments:

1. Study of principle of operation of various types of electromechanical measuring instruments.

2. Measurement of resistance using Wheatstone Bridge.

3. Measurement of resistance using kelvin's Bridge.

4. Measurement of self inductance using Anderson's Bridge.

5. Measurement of capacitance using Schering Bridge.

6. Plotting of Hysteresis loop for a magnetic material using flux meter.

7. Measurement of frequency using Wein's Bridge.

8. To study the connections and use of Current and potential transformers and to find out ratio error.

9. Determination of frequency and phase angle using CRO.

10. Measurement of unknown voltage using potentiometer.

11. To find 'Q' of an inductance coil and verify its value using Q- meter.

CS- 254 Lab III

(Object Oriented Programming)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 3**
Total Marks: 50

List of experiments:

To write following programs in C / C++ :

1. Using basic statements like control statements , looping statements, various I/O statements and various data structures.

2. Creating classes in C++ for understanding of basic OOPS features.

3. Representing concepts of data hiding, function overloading and operator overloading.

4. Using memory management features and various constructors and destructors.

5. Representing Inheritance, virtual classes and polymorphism.

6. Writing generic functions.

7. File handling programs.

EE-202 ELECTROMECHANICAL ENERGY CONVERSION

AND

D.C. MACHINES

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. ELECTRO-MECHANICAL ENERGY CONVERSION :
Energy stored in electric and magnetic fields, energy conversion in singly and multiple excited systems, reluctance torque, reluctance and hystersis motors.

2. GENERAL DESCRIPTION OF ELECTRICAL MACHINES :
Description of electric circuits in cylindrical rotor and salient pole machines, MMF of Single and multiple coils, harmonic analysis of induced voltages and armature MMF, Effect of slots, winding factors, Torque in terms of flux and mmf.

3. D.C. MACHINES :
Armature windings, single and double layers, windings & winding diagrams, E.M.F. and torque equations, interaction of fields produced by excitation circuit and armature, effect of brush shift, compensating winding, commutation, causes of bad commutation, methods of improving commutation, methods of excitation of d.c. generators and their characteristics.
D.C. motors: characteristics, starting of shunt and series motor, starters, speed control methods-field and armature control, Ward Leonard method,
Braking: plugging, dynamic and regenerative braking,
Testing: Swinburn's test, Hopkinson test, Field test.
Estimation of losses and efficiency.

4. CROSS-FIELD MACHINES :
Principle of working, analysis of cross-field generator, typical characteristics with different compensations. Applications.

Recommended Books :

1. Electric Machinery Fitzgerald Kingsley & Kusko

2. Principles of D.C. machines Langsdorff

3. Electrical Machines Nagrath & Kothari

4. Electrical Machinery P.S. Bhimbhra

IC-204 LINEAR CONTROL SYSTEMS

Internal Marks: 40 **L T P**
External Marks: 60 **3 2 0**
Total Marks: 100

Introductory Concepts :

Plant, Systems, Servomechanism, regulating systems, disturbances, Open loop control systems, closed loop control systems, linear and non- linear systems, time variant & invariant, continuous and sampled data control systems, illustrative examples.

Modelling :

Formulation of equation of linear electrical, mechanical, thermal, pneumatic and hydraulic systems, electrical and mechanical analogies. Use of Laplace transform, Transfer function, concepts of state variable modelling. Block diagram representation, signal flow graphs and associated algebra, characteristics equation.

Time Domain Analysis :

Typical test -input signals, Transient response of the first and second order systems. Time domain specifications, Dominant closed loop poles of higher order systems. Steady state error and co-efficient, pole-zero location and stability, Routh-Hurwitz Criterion.

Root Locus Technique :

The extreme points of the root loci for positive gain. Asymptotes to the loci, Breakaway points, intersection with imaginary axis, location of roots with given gain & sketch of the root locus plot. .

Frequency Domain Analysis:

Closed loop frequency response, Bode plots, stability and loop transfer function. Frequency response specification, Relative stability, Relation between time and frequency response for second order systems. A and N- circles, log. Magnitude versus Phase angle Plot, Nyquist criterion.

Compensation : Necessity of compensation, series and parallel compensators, compensating network, application of lag and lead compensation.

Control Components: Error detectors- potentiometers and synchros, servo motors, A.C. and D.C. techogenerators, Magnetic amplifiers.

RECOMMENDED BOOKS

1. Modern Control Engineering by K. Ogata, Prentice Hall, N. Delhi, 1974
2. Control System components by J.F. Gibsen, McGraw Hill, 1963
3. Automatic Control System by B. C. Kuo. Prentice Hall 3rd Ed, 1978
4. Control System Engineering by I.J. Nagrath & Gopal, Wiley Eastern Ltd. N. Delhi, 1975

EE-204 APPLIED ELECTRONICS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

Small Signal Low Frequency Transistor Model
Transistor Hybrid model, Determination of h-parameters, Analysis of transistor amplifier circuit using h parameters, comparison of transistor amplifier configurations. Linear analysis of a transistor circuit, physical model of CB transistor.

Low Frequency Transistor Amplifier Circuits
Effect of an emitter bypass capacitor on low frequency response, effect of coupling capacitor on low frequency response, cascading of transistor amplifiers, CE hybrid model, analysis of CC and CB configurations, CE amplifier with emitter resistance, Emitter follower, Miller's theorem, high input- resistance transistor circuits, cascade transistor configuration, difference amplifiers.

High Frequency Transistor
The high frequency T model, common base short circuit current frequency response, alpha cut off frequency, common emitter short circuit current frequency response, hybrid pi CE transistor model, hybrid pi conductance in terms of low frequency h parameters, CE short circuit current gain obtained with hybrid pi model, current gain with resistive load.

Large Signal Amplifiers
Class A direct coupled with resistive load, Transformer coupled with resistive load, design theory, power amplifier design, harmonic distortion, power output, variation of output power with load, thermal runaway, output transformer saturation, push-pull amplifiers, operations of class A push-pull amplifier, class B push-pull amplifier, crossover distortion, class AB push-pull amplifier, transistor phase inverter, conversion efficiency of class B amplifier, design of class B push-pull amplifier, complementary symmetry amplifier.

Oscillators
Effect of positive feed back, requirements for oscillations, phase shift oscillator, colpitts oscillator, Hartley oscillator, Wein bridge oscillator, general form of oscillator circuit, crystal oscillators, frequency stability, negative resistance in oscillators.

Regulated power supplies
Unregulated power supplies, zener diode voltage regulators, transistor series and shunt regulators, current limiting, Op-Amp voltage regulators, integrated circuit voltage regulators, line and load regulations, introduction to SMPS and its various topologies.

Books Recommended

1. Electronic Devices & Circuits by Millman- Halkias, Tata Mcgraw Hill
2. Electronic Devices & Circuit Theory by Boylestad, PHI
3. Electronic Devices & Circuits by Allen Mottershead, PHI

EE-206 INSTRUMENTATION ENGINEERING

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

1. ELECTRONIC INSTRUMENTS :

Electronic voltmeter and current probes, tuned type and sampling type voltmeter, current probes for D.C. and A.C. measurements, electronic multimeter - construction, measurement of D.C. and A.C. voltage and current, measurement of resistance.

CRO- Construction, synchronisation, measurement of voltage,current, phase and frequency.

Digital Instruments -Comparison of analog and digital instruments, digital voltmeter, multimeter and frequency meter.

2. TRANSDUCERS:

Terminology and definition, classification, transducing principles and elements, ultrasonic, optical and infrared sensors, inductive, capacitive and resistive transducers for measurements of length, thickness, displacement, velocity, torque, level, pressure, temperature, flow, humidity, moisture, and pH.

Block diagram representation of instrumentation system

3. END DEVICES:

Recorders: x-y recorders, strip-chart recorder, magnetic and potentiometric recorder.

Digital displays- LED & LCD

Introduction to Data Acquisition systems.

RECOMMENDED BOOKS :

1. A course in Electrical & Electronic Instrumentation A.K. Sawhney

2. Handbook of Transducer for Electronic Measuring system H.N. Norton

3. Instrumentation Devices & Systems Rangon, Mani & Sharma.

EC-204 Digital Electronics

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Number System And Binary Code: Introduction, Binary, Octal and hexadecimal number system. Signed and unsigned number, Binary operations-addition; Subtraction, Multiplication and division; Subtractions using 1's and 2's compliment; ASCII code; Excess 3 code, Gray code.

2. Minimization of logic function: OR, AND,NOT,NOR,NAND,EX-OR, Basic theorem of Boolean Algebra, sum of products and product of sums, canonical form, Minimisation using theorems, minimization using K-map and Q-M method. Incompletely specified functions.

3. Combinational Logic Circuits: Introduction, Combinational circuit design, multiplexers, demultiplexer, encoders, decoders, adders, substractors and code converters, parity checker, BCD display drive, magnitude comparators.

4. Sequential Circuits : Introduction, flip flop SR, JK, D, T edge triggered and decked flip-flop, Registers. Type of Registers, circuit diagram, timing wave form and operations counters, counter design with state equation and state diagrams.

5. D/A and A/D Converters: Introduction, Weighted register D/A converter, binary ladder D/A converter, steady state accuracy test, D/A accuracy and resolution, parallel A/D converter, Counter type A/D converter Successive approximation A/D converter. Single and dual slope A/D converter A/D accuracy and resolution, Voltage of frequency conversion, Voltage of time conversion.

6. Semiconductor Memories : Introduction, Memory organization, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories. Content addressable memories. Programmable logic arrays, Charged-Coupled device memory.

7. Logic Families : RTL, DCTL, DTL, TTL, ECL and its various types, Comparison of logic families.

Recommended Books :

1. Digital principle and applications Malvino (TMH)
2. Modern digital electronics R. P. Jain (PHI)
3. Digital electronics principle Malvino (THM)
4. Modern digital systems design Cheung & ----- (WPC)
5. An Engg. Approach to digital design Fletcher (PHI)

EE-208 ELECTRICAL ENGINEERING MATERIALS

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. Dielectric Materials:

Static dielectric constant, Polarization, atomic interpretation of the dielectric constant of mono-atomic and poly atomic gases, internal fields in the solids and liquids, static dielectric constants of solids, ferroelectric materials and spontaneous polarization, piezo- electricity. frequency dependence of electronics, ionic and orientational polarization, complex dielectric constant and dielectric losses.

2. Conductivity of Metals:

Ohm's Law and relaxation time of electrons, collision time and mean free path. Electron scattering and resistivity of metals. Heat developed in current carrying conductor, thermal conductivity of metals, superconductivity.

3. Magnetic Materials :

Magnetisation from microscopic view point, orbital magnetic dipole movement and angular momentum materials, diamagnetism, origin of permanent magnetic dipoles in material. paramagnetic spin systems.

4. Properties of ferromagnetic materials:

Spontaneous magnetisation and the curie-Weils Law. Ferromagnetic Domains and coercive force, anti-ferromagnetic and ferromagnetic materials. magnetic materials for electrical devices, introduction to permanent magnets.

Books Suggested:

1. Electrical Engineering materials by A.J. Dekker.

2. Electrical Engineering Materials by G.P. Chhalotra.

3. Electrical Engineering materials by S.P. Seth and P.V. Gupta.

EC-210 LAB-IV
(Applied Electronics)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of Experiments:

1. To study various coupling techniques for transistor amplifiers.
2. To measure small signal parameters of the BJT.
3. To observe the transfer function of the output voltage v/s frequency around the critical frequency in coupling and bypass circuits.
4. To observe the change in critical frequency of a CE amplifier because of feed back capacitances in a BJT (Miller Effect).
5. To study the characteristics of a class A amplifier.
6. To study the characteristics of class B amplifier.
7. To study the characteristics of class C amplifier.
8. To study the characteristics of a class AB amplifier.
9. To study the characteristics of a class B push-pull amplifier.
10. To study the characteristics of a complementary symmetry amplifier.
11. Study of an emitter follower.
12. To design and study various types of oscillators.
13. Zener diode voltage regulator.
14. To design a transistor series voltage regulator with current limit and observe current feedback characteristics.

EC-212 Lab V (Digital Electronics)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of Experiments:

1. (a) Verification of the truth tables of TTL gates, e.g., 7400, 7402,7404, 7408, 7432,7486.
   (b) Design, fabrication and testing of low frequency TTL clocks using NAND gates.

2. (a) Verification of the truth table of the Multiplexer 74150.
   (b) Verification of the truth table of the De-Multiplexer 74154.

3. Design and verification of the truth tables of half adder and full adder circuits using gates 7483.

4. Study and verification of the operations of ALU 74181 with regards to addition/ subtraction / comparison.

5. Design fabrication and testing of differentiator and integrator circuits using OP AMP.

6. Design fabrication and testing of clipper and clamper circuits using OP AMP.

7. Design fabrication and testing of
   (a) Monostable multivibrator of t=0.1 msec.approx.) using 74121/123. Testing for both positive and negative edge triggering, variation in pulse with and retriggering.

   (b) Free running multivibrator at 1 KHz and1 Hz using 555 with 50% duty cycle. Verify the timing from theoretical calculations. 8. Design fabricate and test a switch debouncer using 7400.

9. (a) Design and test of an S-R flip-flop using TOR/NAND gates.

   (b) Verify the truth table of a J-K flip-flop (7476)

   (c) Verify the truth table of a D flip-flop (7474) and study its operation in the

   toggle and asynchronous modes.

10. Operate the counters 7490, 7493 and 74192. Verify the frequency division at

    each stage. With a low frequency clock (say 1 Hz) display the count on LEDs.

11. (a) Verify the truth table of decoder driver 7447 / 7448. Hence operate a 7

    segment LED display through a counter using a low frequency clock.

    (b) Repeat the above with the BCD to Decimal decoder 7442 and an array of LEDs.

EE-210 Lab VI

(Control and Instrumentation Lab.)

Internal Marks: 30
External Marks: 20
Total Marks: 50

L T P
0 0 2

List of Experiments:

1. To study the input-output characteristics of a potentiometer and to use a potentiometer as an error detector.
2. To study transmitter - receiver characteristics of a synchros set and to use the set as control component.
3. To study the operation of d.c. position control servo system.
4. To study the operation of an a.c. position servo system.
5. To design different compensating networks for the given cut off frequency response.
6. Study of a stepper motor and control of its direction, speed and no. of steps with the help of a microprocessor.
7. To study PID controller and to obtain the effect of proportional, Integral and derivative control action.
8. Measurement of displacement using LVDT.
9. Measurement of pressure using pressure transducer .
10. Temperature measurement using temperature sensor (RTD).
11. Light measurement using LDR & photo cell censor.
12. Water level measurement using capacitance transducer.
13. Velocity measurement using air flow transducer.
14. RPM measurement using electromagnetic transducers.

EE-212 Lab VII (Electrical Machines-I Lab)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of Experiments:

1. Load test on a single phase transformer .

2. To perform Open circuit and short circuit tests on a single phase transformer and hence find equivalent circuit , voltage regulation and efficiency.

3. To find the efficiency and voltage regulation of single phase transformer under different loading conditions.

4. To perform parallel operation of two single phase transformers.

5. To study the various connections of three phase transformer.

6. To study the constructional details of D.C. machine and to draw sketches of different components.

7. To measure armature and field resistance of d.c. shunt generator and to obtain its open circuit characteristics.

8. To obtain load characteristics of d.c. shunt/series /compound generator.

9. To draw speed-torque characterisitcs of d.c. shunt/series /compound generator.

10 . To study d.c. motor starters.

11. To perform swinburne's test (no load test) to determine losses of d.c. s

EE-301 ASYNCHRONOUS MACHINES

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. BASIC CONCEPTS:

Field distribution of space distributed three-phase winding, concept of rotating field, production and concept of asynchronous and synchronous torques.

2. POLYPHASE INDUCTION MACHINES:

Constructional features, operation, equivalent circuit, phasor diagram , leakage reactance and it's importance on machine performance, effect of rotor circuit resistance, starting torque, cage motors, double cage and deep bar motor. Generator action, methods of excitation, space harmonics and their effect on motor performance, starting methods, speed control: (i) control of speed of rotating field, (ii) control of slip speed. Estimation of equivalent circuit parameters Effect of voltage injection in rotor circuit of slip ring induction motor, action of commutator, scherbius and kramer schemes of speed and P.F. control of induction motors.

3. STEPPER MOTORS AND LINEAR INDUCTION MACHINES

Stepper Motors: construction, principle of operation and applications.
Linear Induction Machines: construction, principle of operation and applications.

4. SINGLE –PHASE MOTORS:

Single phase induction motor, double revolving field theory, equivalent circuit, characteristics.
phase splitting, shaded pole motor, single phase series and repulsion motor: working and characteristics.

RECOMMENDED BOOKS:

1. Electric machinery — A.E. Fitzgerald and C. Kingsley.
2. Theory of A.C. machines — A.S. Langsdorf.
3. The performance and design of A. C. Commutator Machines. — E.O. Taylor.

EE-303 ELECTROMAGNETIC FIELD THEORY

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

. Review of Vector Analysis

Vector analysis, Physical interpretation of gradient, divergence and curl; vector relations in other coordinate systems, integral theorems: divergence theorem, stoke's theorem, green's theorem and Helmholtz theorem.

2. Electrostatics

Introduction to fundamental relations of electrostatic field; Gauss's law and its applications; potential function; Field due to continuous distribution of charges; Equipotential surfaces; Divergence theorem; Poisson's equation and Laplace's equation, capacitance, electrostatic energy, Conditions at Boundary between dielectrics, Uniqueness theorem.

3. **The Steady Magnetic Field**

Magnetic induction and Faraday's laws; magnetic Flux Density; magnetic field strength and magnetomotive force; Ampere's work Law in the differential vector form; permeability; energy stored in a magnetic field ; ampere's force law; magnetic vector potential, Analogies between electric and magnetic fields.

4. **Maxwell's equations and Poynting vector**

Equation of continuity for time varying fields, Inconsistency of ampere's law, Maxwell's equations, conditions at a Boundary surface, Poynting Theorem, Interpretation of ExH

5. **Electromagnetic Waves**

Solutions for free-space conditions; Uniform plane Wave Propagation; Wave equations for a conducting medium; Sinusoidal time variations; Polarization; Conductors and Dielectrics; Direction Cosines; Reflection by Perfect Conductor -normal and oblique incidence, Perfect Dielectric-normal incidence, Perfect Insulator –Oblique incidence; Reflection at a surface of Conductive medium.

REFERENCES

1. Electromagnetic Waves and Radiating Systems By Edward C. Jordan
2. Electromagnetics By John D. Kraus
3. Elements of Engineering Electromagnetics By N. Narayana Rao
4. Schaum's theory and problems of Electromagnetics By Joseph A. Edminister

EE-305 POWER SYSTEMS - I

(Transmission and Distribution)

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. SUPPLY SYSTEM

Introduction to Transmission and Distribution systems, Comparison between DC and AC systems for Transmission and Distribution, comparison of cost of conductors, choice of working voltage for transmission & distribution, economic size of conductors - Kelvin's law, Radial & mesh distribution networks, Voltage regulation.

2. **GENERAL**

Conductor materials; solid, stranded, ACSR, hollow and bundle conductors. Different types of supporting structures for overhead lines. Elementary ideas about transmission line construction and erection. Stringing of conductors, spacing, sag and clearance from ground, overhead line insulators, concept of string efficiency.

3. TRANSMISSION LINE PARAMETERS

Introduction to line parameters, Resistance of transmission line, inductance of single phase two wire line, concept of G.M.D., Inductance of three phase line, Use of bundled conductor, transposition of power lines, capacitance of 1-phase and 3-phase lines. effect of earth on capacitance of conductors.

4. PERFORMANCE OF TRANSMISSION LINES

Representation of short transmission line, medium length line (nominal T & II circuits). long length line by hyperbolic equations and equivalent T & II circuits. Power flow through transmission lines, ABCD constants, Voltage regulation.

5. **CIRCLE DIAGRAM AND LINE COMPENSATION**

Receiving end circle diagram for long transmission lines based on ABCD constants, equivalent T circuits , power loci, surge impedance loading, reactive power requirement of system series and shunt compensation, Synchronous phase modifiers , rating of phase modifiers.

6. UNDERGROUND CABLES

Classification of cables based upon voltage and dielectric material, insulation resistance and capacitance of single core cable, dielectric stress, Capacitance of 3 core cables, methods of laying, heating effect, Maximum current carrying capacity, cause of failure, comparison with overhead transmission lines.

Recommended Books

1. Electrical Energy System Theory - An introduction — O.L. Elgerd(TMH)
2. Elements of Power System Analysis — W.D. Stevenson Jr.(TMH)
3. Course in Electrical Power — C.L. Wadhwa, New Age Int.(P)Ltd.
4. Power System Analysis — Nagrath and Kothari (TMH)
5. Power System Analysis & Design — B.R. Gupta, Wheeler Publishing.

EE-307 MICROPROCESSORS AND INTERFACING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Introduction to Microprocessors

Types of computers, Microprocessor Evolution and types, CPU operation and terminology, idea of 8- bit, 16-bit, 32-bit and 64- bit Microprocessors from Intel, Motorola and Zilog and their comparisons.

2. Introduction to 8-bit Microprocessor

8085 mpu architecture, instruction classification, instruction & Data format, overview of the 8085 instruction set.

3. Introduction to 16-bit Microprocessor

8086 Internal Architecture, Addressing modes, program development steps, 8086 instruction set Assembler directives, Assembly language, program development tools.

4. Programming of 8086

Simple sequence programs, jumps, flags, conditional Jumps, if then, If-then-else, Multiple If-then-else, while-Do, Repeat-until, Instruction Timing and delay loops, strings, procedures, Macros.

5. 8086 System Connections, Timing, Trouble shooting.

Pin-diagram, maxImin. modes, timing diagrams, use of logic analyzer to observe Bus Signals, trouble shooting a simple 8086 based system

6. 8086 Interrupts & Applications

8086 Interrupts, responses & applications, 8254 software- programmable timer/counter, 8259 A priority Interrupt Controller

7. Interfacing of 8086

Programmable parallel ports & handshake, Interfacing a Microprocessor to Keyboards and alphanumeric displays, D/A converter operation, interfacing and applications, *A/D* converter specifications, Types and Interfacing.

BOOKS RECOMMENDED

1. Microprocessor Architecture, Programming and Applications with the 8085
By Ramesh S. Gaonkar, Penram International
2 . Microprocessors and interfacing: programming & Hardware
By Douglas V. Hall, Tata McGraw Hill

EE – 309 POWER ELECTRONICS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Thyrlstors and their characteristics :

Introduction to thyristor family V-I characteristics of SCR, SUS, PUT, SCS, GTO, LASCR, DIAC and TRIAC. Principle of operation of SCR. Two transistor analogy. Turn on methods of a thyristor Switching charactgeristics of thyristors during tum-on and turn-off. Gate characteristics. Firing of thyristors. Gate triggering circuits. Series and parallel, operation of SCRs and their triggering circuits. Thyristor specifications; such as latching current and bolding current, dv/dt and di/dt, PTV etc. Protection of SCR from over voltage and over current. Snubber circuits. Power dissipation.

2. Thyristor commutation techniques :

Load commutation (Class A), Resonant-Pulse commutation (class B), impulse commutation (class D), Line commutation (class F).

3. Phase controlled techniques :

Introduction to phase angle control. Single phase half wave controlled rectifiers. Single phase half controlled and full controlled bridge rectifiers. Three phase full controlled bridge rectifiers. Effect of resistive, inductive and resistive cum inductive loads. Basic circuit and principle of operation of Dual Converter, circulating current mode and non-circulating current mode of operation. Applications of rectifiers and dual converters to speed control of DC motor drives.

4. Choppers

Introduction and principle of chopper operations. Control strategies, two quadrant chopper, Four quadrant chopper. Regenerative chopper. Steady state time domain analysis of type A-chopper, voltage commutated chopper or classical Jones chopper.

5. Cycloconverters

Basic circuit and operation of single phase cycloconverter. Single phase bridge cycloconverter. Three phase to single phase to single phase cycloconverter. Advantages disadvantages of cycloconverters.

6. Inverters :

Introduction to inverter. Operating principle and already state analysis of single phase, voltage source, bridge inverter. Modified Mcmurray half-bridge and full bridge inverter. Three phase bridge inverter. Voltage control (PWM control etc.) and reduction of harmonics in the inverter output voltage. Series inverter.

Books Recommended

1. P.S. Bimbhra, Power Electronics, Khanna Publishers.
2. M.D. Singh, K.B. Khanchandani, Power Electronics, Tata Mc Graw Hill Publishing company limited.
3. M.H. Rashid, Power Electronics, PHI.
4. P.C. Sen, Power Electronics, Tata Mc Graw Hill Publishing company limited.

EE 311/AM-351 NUMERICAL ANALYSIS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Conditions for convergence of an iterative method, rate of convergence of an iterative method, comparison of False Position, Newton-Raphson and Secant methods, conversion of a divergent functional iteration scheme into a convergent one.
Newton-Raphson method for solution of nonlinear system of equations.

2. NUMERICAL METHODS IN LINEAR ALGEBRA

Computation of determinant, pivot, partial and complete pivoting technique, triangularization algorithm, triangular decomposition of a matrix, properties of triangular matrices,
Least squares curve fittings,
Solution of homogeneous linear equations.

3. NUMERICAL DIFFERENTIATION AND INTEGRATION

Numerical differentiation using finite differences, numerical integration, Newton-Cote's formula, trapezoidal rule for integration, Simpson's 1/3 rule, Simpson's 3/8 rule.

4. NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS

Numerical solution of first order ordinary differential equation using Taylor's series, Picard's, Euler's, Modified Euler's method, Runge -Kutta method of fourth order.

EE-313 LAB-VIII
(MICROPROCESSORS LAB.)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of experiments:

1. Familiarisation with the microprocessor kits.
2. Simple programs for sorting a list of numbers in ascending and descending order.
3. Program for addition of BCD number.
4. Interface an LED array & 7-segment display through 8255 and display a specified bit pattern or character sequence.
5. Generate different waveforms using a DAC.
6. Stepper motor Control using 8085.
7. Rolling display using 8279.
8. Interfacing of 8085 with ADC.
9. Using 8255 display devices.
10. Using DMA controllers, transfer the data from memory to the output LED.
11. Transmit the given data to the 8251 and retransmit it to the CPU and display on the screen.

EE – 315 POWER ELECTRONICS LAB

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of Experiments :

1. To study principle of operation of SCR, plot V-I characteristics and study the effect of gate triggering on turning on of SCR.

2. To draw V-I characteristics of an UJT and to use UJT as relaxation oscillator.

3. To study the effect of free-wheeling diode on power factor for single phase half-wave rectifier with R-L load.

4. To plot waveforms for output voltage and current, for single phase full-wave, fully controlled bridge rectifier, for resistive and resistive cum inductive loads.

5. Study of the microprocessor based firing control of a bridge converter.

6. To study three phase fully controlled bridge converter and plot waveforms of output voltage, for different firing angles.

7. Study of Jones chopper or any chopper circuit to check the performance.

8. Thyristorised speed control of a D.C. Motor.

9. Speed Control of induction motor using thyristors.

10. Study of series inverter circuit and to check its performance.

11. Study of a single-phase cycloconverter.

12. To check the performance of a Mc Murray half-bridge inverter.

EE-317/AM-353 Lab X

(Numerical Analysis Lab.)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

To Develop algorithms/programs in C or C++ language for the following methods

(i) Bisection method for finding a real root of an equation.

(ii) Newton Raphson method for finding a real root of an equation.

(iii)Iteration method for finding a real root of an equation.

(iv)Gauss elimination method for solving simultaneous linear algebraic equations.

(v) Gauss Jordan method for solving simultaneous linear algebraic equations.

(vi)Simpson's 1/3rd rule for numerical integration.

(vii)Newton's forward interpolation formula.

(viii)Lagrange's method for interpolation.

(ix)Euler's method for solving ordinary differential equations.

(x) R-K method for solving ordinary differential equations.

EE-319 Lab XI

(Control Systems Using MATLAB)

Internal Marks: 30	**L T P**
External Marks: 20	**0 0 2**
Total Marks: 50	

To perform exercises related to the following using Control System Toolbox by writing computer programs and functions in MATLAB:

- Time and Frequency response of control systems
- Plotting of Bode, Nyquist and Root Loci diagrams.
- Design of Control Systems using MATLAB and SIMULINK.

EE-302 SYNCHRONOUS MACHINES

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. GENERAL ASPECTS

Construction & working principle of synchronous machines, Excitation systems, production of sinusoidal E.M.F., flux & mmf phasors in syn. machines; cylindrical & salient pole rotors.

2. WINDINGS

Classification of windings, pitch factor, distribution factor.
E.M.F. equation.

3. ALTERNATORS

Construction, Phasor diagram of cylindrical rotor alternator, ratings, nature of armature reaction, determination of synchronous reactance; open circuit characteristics, short ckt characterstics, short ckt ratio, short ckt. loss. Effect of variation of power factor on voltage. Determination of voltage regulation: EMF method, M.M.F. method. Z.P.F. method.

Alternator on infinite bus bar, operating characteristics, operation at constant load and variable excitation, power flow through inductive impedance.

Power-angle characteristics of syn. machines:- cylindrical & salient pole. Two reaction theory of salient pole machines, power factor control.

4. SYNCHRONOUS MOTORS

Operating characteristics, power-angle characteristics, conditions for maximum power developed . V-curves and inverted V-curves, methods of starting, synchronous motors applications, synchronous condensers.

5. PARALLEL OPERATION OF ALTERNATORS

Conditions for proper synchronizing for single phase and three phase alternators, conditions for parallel operation, synchronizing power, current and torque, effect of increasing excitation of one of the alternators, effect of change of speed of one of the alternators, effect of unequal voltages, load sharing.
Hunting and damper windings.

6. TRANSIENTS

Transients Analysis, transient reactances & time constants from equivalent circuits, synchronous machine reactances & their determination,Short ckt. Oscillogram,
Synchronisation with the grid system,
Qualitative introduction to the transient stability of the synchronous machines.

7. SINGLE PHASE SYNCHRONOUS MOTORS

Reluctance & Hysteresis motors.

Books Recommended

1. Electric machines — Fitzgerald & Kingsley (Mc Graw Hill)
2. Electric machinery and transformer — M.Kosow. (PHI)
3. Theory of alternating current machines — A.S. Langsdorf
4. Electrical machines — Nagrath & Kothari (TMH)
5. Performance,design and testing of A.C. machines — MG Say (CBS,Delhi)

EE-304 ELECTRIC DRIVES AND UTILIZATION

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Electric Drives:

Basic features of industrial drives, review of operating and starting characteristics of different types of electric motors for various drives. Estimation of rating, Load equalization (Fly wheel effect), Drives for particular services.

2. Electric Traction:

Various types of Traction system, 25KV, 50Hz, single phase feeding arrangement prevalent in India. Substation. arrangements, Different Types of Catenary construction and line insulation, Span and dropper design Calculations.

3. Electric Heating and Welding:

Methods of electric heating, constructional details & performance of resistance heating furnace. Dielectric heating, A.C.& D.C. Welding, Resistance and Arc Welding. Electric Beam Welding ,Laser Welding.

4. Illumination:

Production of light by different methods, terms used, laws of illumination, Different Artificial light sources, their construction and operating principles, Design of lighting schemes and equipment used for indoor, industrial and flood lighting.

5. Refrigeration and Air conditioning:

Refrigeration system, Domestic refrigeration, Air conditioner, Comfort Air conditioning, Effective temperature.

6. Electrolysis:

Laws of Electrolysis, Process voltage, current, energy, efficiency, Applications of electrolysis.

Recommended Books:

1. Electric Traction — H.Partab
2. Electric Drives & Utilization — H. Partab
3. Electric Drives — De &Sen(PHI publication)
4.. Electric Motor Drives — M.S.Berde(Khanna Publishers)
5. Utilization of Electric Power — J.B. Gupta(S.K.Kataria &Sons)
6. Electric Energy Utilization & Conservation — Tripathi(Tata Mc Graw. Hill)
7. Electric Energy Utilization — E.O.Taylor

EE-306 POWER SYSTEM-II
(Switchgear & Protection)

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Sub-Station:
Types, Main equipment in Substation, substation layout, Busbar-arrangements.

2. Isolators & Fuses:
Isolating switches functions, Types, Rating and operation. Fuse-types, Rating, Selection, theory and characteristics, applications.

3. Circuit Breakers:
Need for Circuit Breakers, Arc phenomenon, Theory of Arc Interruption, Recovery Voltage and Restriking Voltage, Various Types of Circuit Breakers. Principles and Constructional Details of Air Blast, Minimum Oil, SF_6, Vacuum Circuit Breakers etc.

4. Protective Relays:
Introduction, classification, constructional features; and Characteristics of Electromagnetic, Induction, Thermal, Overcurrent relays, Directional relays, Distance relays, Differential, Translay, Negative sequence relay, introduction to static and up-based relays.

5. Protection of Feeders:
Time graded protection, Differential and Distance protection of feeders, choice between Impedance, Reactance and Mho relays, Elementary idea about carrier current protection of lines.

6. Protection of Generators & Transformers:
Types of faults on alternator, Stator and rotor protection, Negative sequence protection, Loss of excitation and overload protection.
Types of fault on transformers, percentage differential protection, Gas relays.

7. Protection against over voltage and earthing:
Ground wires, Rod gap, Impulse gap, Valve type and Metal Oxide Arresters, Line Arrester/Surge Absorber. Ungrounded neutral system, Grounded neutral system and Selection of Neutral Grounding.

Books Recommended:

1) Switchgear and Protection — Sunil S. Rao (Khanna Publishers)
2) Power System Engg. — Soni Gupta & Bhatnager (Dhanpat Rai&Sons)
3) A Course in Electrical Power — C.L.Wadhawa (New Age international Pvt. Ltd)
4) Power system Protection & Switchgear — Badriram & D.V.Vishwakarma (TMH)
5) Switchgears & Protection — M.V. Deshpande (THM)

CE-216 ENVIRONMENTAL SCIENCE

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

Unit 1 : The Multidisciplinary nature of environmental studies

Definition, scope and importance

(2 Lectures)

Need for public awareness.

Unit 2 : Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources : Use and over-Utilization of surface and ground water, floods, drought, conflicts and water, dams-benefits and problems.
c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3 : Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :-

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit 4 : Biodiversity and its conservation

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loass, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ conservation of biodiversity.

Unit 5 : Environmental Pollution
Definition

- Causes, effects and control measures of :-
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit 6 : Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rahabilitation of people ; its problems and concerns. Case studies.
- Environmental ethics : Issues and possible solutions.

- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.

- Consumerism and waste products.
- Environment Protection Act.
- Air (Preventation and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

(7 lectures)

Unit 7 : Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV / AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

Unit 8 : Field work

- Visit to a local area to document environmental and river forest grassland hill mountain.
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

ME-352 POWER PLANT ENGINEERING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

Steam Generators, Condensers and Turbines:
Classification of steam generators, selection, operation of locomotive, Babcock Wilcox, Cochran boilers, Types of condensers, effect of air in condensers, Dalton's law of partial pressure, cooling water calculations, steam nozzles, types of steam turbine efficiencies, compounding, governing and control.

Steam Power Plant:
Classification, Operation, Description of Rankine cycle, Regenerative cycle, Reheat-Regenerative Cycle, Binary Vapour Cycle, Selection of plant site and its layout, coal handling system, combustion system, Fluidised bed combustion, Ash handling, Feed pumps, Heat exchangers, Economizers, Super heaters, Reheaters, Air preheaters, Feed water heaters, Evaporators.

Hydro-Electric Power Plants:
Hydrological Cycle, Hydrograph, Flow duration curve, Selection of site, Essential features, Classificatioon of hydro plants, Selection of water turbines for hydro power plant, Automatic and remote control of hydrostation, layout of hydro power plant.

Nuclear power plants:
Nuclear physics, Binding energry,Radio active decay.Fertile material,Mass defect,Nuclear reactions type and appilication,Genration of nuclear energry by fission, Nuclear reaactors. Site selections, safety measures, plant layout,Fusion reaction,Future of nuclear power.

Gas Turbine:
Elements of gas turbines, Open and closed cycles for gas turbines, Performance terms, Thermal refinement to gas turbines cycle, Plant layout, applications, gas turbines Cycle calculations.

Diesel Power Plants:
Classifications of IC Engines and their performance, Four stroke and two stroke diesel engines, combustion phenomenon; Essential components, Celane number, knocking, super charging, operation and layout of diesel power plant.

Combined Operation of Different Power Plants:
Advantages of combined operation of plants, load division between power stations, coordination of different types of Power Plants.

Pollution Control:
Pollution from thermal & nuclear plants, Particulate emission and control, electrostatic precipitator, solid waste disposal.

Reference Books:

1.	A course in Electrical Power	Soni,Gupta & Bhatanagar (Dhanpat Rai & Sons)
2.	Power Plant Engineering	P.C. Sharma (Kataria & Sons)
3.	Power Station Engineering and Economy	B.G.A. Skrotzki & W. A Vapot (TMH)
4.	Power Plant Engineering	R.K. Rajput (Luxmi Publications)
5.	Power Plant Engineering	M.M. EI Wakit (Mc Graw Hill, USA)

EE-308 Lab-XII (Electrical Machines II Lab)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of experiments:

1. To Perform load-test on 3 ph. Induction motor & to plot torque V/S speed characteristics.
2. To Perform no-load & blocked –rotor tests on 3 ph. Induction motor to obtain equivalent ckt. Parameters & to draw circle diagram.
3. To study the speed control of 3 ph. Induction motor by Kramer's Concept.
4. To study the speed control of 3 ph. Induction motor by cascading of two induction motors, i.e. by feeding the slip power of one motor into the other motor.
5. To study star- delta starters physically and
   (a) to draw electrical connection diagram
   (b) to start the 3 ph. Induction motor using it.
   (c) To reverse the direction of 3 ph. I.M.
6. To start a 3 phase slip –ring induction motor by inserting different levels of resistance in the rotor ckt. And to plot torque –speed characteristics.
7. To perform no-load & blocked –rotor test on 1 ph. Induction motor & to determine the parameters of equivalent ckt. Drawn on the basis of double revolving field theory.
8. To Perform load –test on 1 ph. Induction motor & plot torque –speed characteristics.
9. To Perform no load & short ckt. Test on 3- phase alternator and draw open ckt. And short ckt. Characteristics.
10. To find voltage regulation of an alternator by zero power factor (z.p.f.) method.
11. To study effect of variation of field current upon the stator current and power factor with synchronous motor running at no load and draw V & inverted V curves of motor.
12. To measure negative sequence & zero sequence reactance of Syn. Machines.

EE-310 Lab-XIII Software Lab(Visual Basic Programming)

Internal Marks: 30	**L T P**
External Marks: 20	**0 0 2**
Total Marks: 50	

Overview of Integrated Development Environment and its elements – menu bar, tool bars, project explorer, tool box , properties of windows , form designer, form layout etc.

The Visual Basic language and its elements, variables, constants, arrays, collections, subroutines, functions, arguments and control structures .

Designing a VB application:- Working with Visual Basic forms, adding , deleting & managing forms at run time, coding event procedures , menu designing ,adding menu interface to forms, attaching events to code ,dynamic menu appearance.

Students are to develop some projects related to Electrical Engineering .

Books Recommended:-

1. Visual Basic 6 Programming Black Book, Dream tech Publication by Steven Holzner.

Note:-Only Practical Exam. is to be conducted. No theory exam. is to be conducted.

EE-312 Lab XIV

(Power Systems- II Lab.)

Internal Marks: 30	**L T P**
External Marks: 20	**0 0 2**
Total Marks: 50	

List of experiments:

1. To study the performance of a transmission line. Also compute its ABCD parameters.
2. Study of Characteristics of over current and earth fault protection.
3. To study the operating characteristics of fuse. (HRC or open type)
4. To find the earth resistance using three spikes
5. To study over current static relay.
6. To study the different types of faults on transmission line demostration panel/model.
7. To study the radial feeder performance when
   (a) Fed at one end.
   (b). Fed at both ends
8. To study the performance of under voltage and over voltage relay.
9. To study the characteristics of bimetal mini circuit breakers.
10. To study the characteristics of Distance Relay.
11. To find the breakdown strength of transformer oil.

EE-314 Minor Project

Internal Marks: 60	**L**	**T**	**P**
External Marks: 40	**0**	**0**	**2**
Total Marks: 100			

Electrical estimation and costing of electrical installations in domestic, commercial and industrial sector:
Installation plans, single line representation, wiring diagrams, list of materials required with specifications, Protective devices and earthing practices.
Estimation and costing for installation / erection of a typical transmission line.

HU-251 HUMAN RESOURCE MANAGEMENT

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

Introduction: Introduction to Human Resource Management and its definition, functions of Human Resource Management & its relation to other managerial functions. Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization.

Procurement and Placement: Need for Human Resource Planning; Process of Human Resource Planning; Methods of Recruitment; Psychological tests and interviewing; Meaning and Importance of Placement and Induction, Employment Exchanges (Compulsory Notification of vacancies) Act 1959, The Contract Labour (Regulation & Abolition) Act 1970.

Training & Development: Difference between training and Development; Principles of Training; Employee Development; Promotion-Merit v/s seniority Performance Appraisal, Career Development & Planning.

Job analysis & Design: Job Analysis: Job Description & Job Description, Job Specification.

Job Satisfaction: Job satisfaction and its importance; Motivation, Factors affecting motivation, introduction to Motivation Theory; Workers ' Participation, Quality of work life.

The Compensation Function: Basic concepts in wage administration, company's wage policy, Job Evaluation, Issues in wage administration, Bonus & Incentives, Payment of Wages Act-1936, Minimum Wages Act-1961

Integration: Human Relations and Industrial Relations; Difference between Human Relations and Industrial Relations, Factors required for good Human Relation Policy in Industry; Employee Employer relationship Causes and Effects of Industrial disputes; Employees Grievances & their Redressal, Administration of Discipline, Communication in organization, Absenteeism, Labour Turnover, Changing face of the Indian work force and their environment, Importance of collective Bargaining; Role of trader unions in maintaining cordial Industrial Relations.

Maintenance: Fringe & retirement terminal benefits, administration of welfare amenities, Meaning and Importance of Employee Safety, Accidents-Causes & their Prevention, Safety Previsions under the Factories Act 1948; Welfare of Employees and its Importance, Social security, Family Pension Scheme, ESI act 1948, Workmen's Gratuity Act 1972, Future challenges for Human Resource Management.

Recommended Text Books:

1. T.N.Chhabra- Human Resource Management (Dhanpat Rai & Co.)

Recommended Reference Books:

1. Lowin B. Flippo - Principles of personnel Management (Mc Graw-Hill)
2. R.C. Saxena - Labour Problems and social welfare (K.Math & Co.)
3. A Minappa and M. S. Saiyada - Personnel Management (Tata Mc. Graw-Hill)
4. C.B. Mamoria - Personnel Management (Himalaya Publishing House, Bombay)
5. T.N. Bhagotiwal - Economics of Labour and Industrial Relations (Sahitya Bhawan Agra)

CS-304 INTRODUCTION TO BUSINESS SYSTEMS

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

OBJECTIVES

To familiarise students with basics of data processing, COBOL and data management packages. It also introduces students to basics of Software Engineering.

COURSE CONTENTS:

Introduction to Business System: Data capture, Processing dissemination storage/retrieval: I/O and storage devices terminals printers and disks.
Principles of Data Processing: Data representation and file management in COBOL Sequential indexed and relative files, User interfaces, report writer screen management. Data Management Software: Packaged software: Word processors spread sheets, Data management packages such as DBASE and FOXPRO.
Principles of Software Engineering: Software development methodology: System analysis, DFD, ER Model design concepts software architecture file (table0 and process design issues in system implementation. Enterprise Resource Planning (ERP) management, Resource Planning (MRP-2) Software like SAP, MARCAN.

Special topics Introduction to Management Information Systems and Decision Support Systems.
TEXT REFERENCES:

1. N.L.Sharda, Structured COBOL Programming with Business application, Pitamber Publishimg Co., First Edition, 1990.
2. M.K.Roy and D.Ghosh Dastidar, COBOL Programming, Tata McGraw Hill 1985.
3. R.S. Pressman, Software Engineering, McGrw Hill Inc., Third Edition, 1992.

EI-304/403 - INDUSTRIAL MEASUREMENTS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Metrology: Line & length standards, gauge blocks mechanical, optical, pneumatic and electrical compactors, interferometry an optical flats, sine bar. Review of displacement, velocity, acceleration and seismic pickups.
2. Pressure Measurement: Standards & calibration, Dead weight piston gages & manometers, elastic transducers bourdon tube, bellows & diaphragm, high pressure measurement, vacuum measurement-Mcleod gage, knudsen gauge, thermal conductivity gases, pirani and ionization gauge.
3. Temperature Measurement: Standards & calibrations, thermal expansion methods bimetallic thermometers, filled in systems, their errors, thermoelectric sensors electric resistance sensors, junction semiconductor sensors, radiation pyrometry.
4. Flow Measurement: Head type, area type, positive displacement type, mass flow meters vortex type, electrical type:- Turbo magnetic, Electro magnetic, ultrasonic Hot wire anemometer, flow marker, open channel flow metering, their working principle and applications.
5. Other variable measurements: Mass weight, force, torque & shaft power measurement, level measurement, Humidity & moisture measurement.

BOOKS RECOMMENDED:

1. Measurement System Application & Design: E.O.Forbrlin McGraw Hill Book Co.,
2. Instrumentation Devices & systems Rangan, Mani Sharma, T MH
3. A course in Mechanical Measurement & Instrumentation A.K.Sawhney Dhanpat Rai & Sons

CH-304 OPTIMIZATION TECHNIQUES

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

INTRODUCTION: Engineering applications of optimization, Design variables, costraints, objective function, variable bounds, statement and formulation of an optimization problem, Examples of Chemical Engg. Optimization problems, classification of optimization problems, different optimization algorithms.

OPTIMAL POINT: Local optimal point, global optimal point and inflection point.

SINGLE VARIABLE OPTIMIZATION TECHNIQUES:
- Optimality criterion.
- Bracketing method (Bounding Phase Method).
- Region elimation methods (Internal halving method, Golden section search method).
- Point estimation method (successive quadratic estimation methods).
- Gradient-based methods (Newton-Raphson method, Bisection method, Secant, Cubic search method).
- Root finding using optimization techniques.

MULTIVARIABLE OPTIMIZATION TECHNIQUES:
- Optimality criterion
- Unidirectional search method
- Direct Search method(Hooke-Jeeves Pattern Search method, Powell's conjugate direction method)
- Gradient-based methods(Steepest descent method, Newton's method, Marquardi's methods)

CONSTRUINED OPTIMIZATION ALGORITHMS:
- Kuhn-Tuckerconditions.
- Transformation method (Penalty function method)
- Direct Search for constrained minimization(variable elimination method, complex search method)

LINEAR PROGRAMMING:
Linear programming problems, Simplex method of linear programming technique.

TEXT BOOK:
Optimization for Engg. Design by Kalyanmoy Deb. (PHI)

REFERENCE BOOKS:
1. Engg. Optimization by S.S.Rao (New Age).
2. Optimization of Chemical Processes by T.I. Edgar & D.M/ Himmalblau (McGraw Hill).
3. Process Optimization with Applications to Metallurgy & Chemical Engg. by Ray & Szekely (Wiley).
4. Optimization: Theory & Practice by Beveridge & Schecter, (McGraw Hill).
5. Numerical Methods in Engg. & Sc. by B.S. Grewal (Khanna Publishers)

ME-251 Total Quality management

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

Detailed Contents

1. Quality and Total Quality Management; Excellence im manufacturing/service, factors of excellence, relevance of TQM.

2. Concept and definition of quality; total quality control (TQC) and Total Quality Management (TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.

3. Just-in-time (JIT): Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation.

4. Customer: Satisfaction, data collection and complaint, redressal mechanism.

5. Planning Process: Policy development and implementation; plan formulation and implementation.

6. Process Management: Factors affecting process management, Quality function development (QFD), and quality assurance system.

7. Total Employees Involvement (TEI): Empowering employees: team building; quality circles; reward and Recognition; education and training, Suggestion schemes.

8. Problems solving Defining problem; Problem identification and solving process; QC tools.

9. Benchmarking definition, concept, process and types of benchmarking.

10. Quality Systems: Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.

11. Advanced techniques of TQM: Design of experiments: failure mode effect analysis: Taguchi methods

BOOKS:

1. Total Quality Management by sunder Raju, Tata Mcgraw Hill

2. TQM for engineers by M.Zairi, Aditya Books

3. Total Quality Management Handbook by J.L. Hradeskym MCGraw Hill

4. ISO 9000 quality System by Dalela and Saurabh, standard Publishers

EE-402 COMPUTER AIDED POWER SYSTEM ANALYSIS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. SYSTEM MODELLING:

System modelling of synchronous machines, transformers, loads etc, per unit impedance, single line diagram of electrical networks, single phase impedance diagrams corresponding to single line diagram. Formation of impedance and admittance matrices for the electrical networks.

2. LOAD FLOW STUDIES:

Data for the load flow studies, Swing Bus, Formulation of simultaneous equations, Iterative solutions by the Gauss-Seidal Method & by Newton Raphson Method.

3. FAULT ANALYSIS:

Transients on transmission line, short circuit of synchronous machine, selection of circuit breakers, Algorithm for short circuit studies, Symmetrical Component transformation, construction of sequence networks of power systems. Symmetrical Analysis of Unsymmetrical LG, LL, LLG faults using symmetrical components.

4. POWER SYSTEM STABILITY:

Steady state stability, Dynamics of a synchronous machine , Power angle equations , Transient stability, equal area criterion, Numerical solution of swing equation , factors effecting transient stability.

Books :

1. Electric Energy Systems Theory — O.I.Elgerd, TMH
2. Modern Power System Analysis — I.J.Nagrath,D.P. Kolthari, TMH
3. Elements of Power System Analysis — W.D.Stevenson, McGraw Hill
4. Power System Engineering — I.J.Nagrath,D.P.Kothari.
5. Computer Aided Power System — J.Arrillaga and C.P.Arnold.
6. Computer Aided Power System Analysis — Glenn W.Stagg. & Elabiad
7. Computer Aided Power System Analysis — Kusic.

EE-404 NON LINEAR AND DIGITAL CONTROL SYSTEMS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

STATE VARIABLE TECHNIQUES :
State variable representation of systems by various methods, solution of state variable model. Controllability and observability.

PHASE PLANE ANALYSIS:
Singular points, Method of isoclines, delta method , phase portrait of second order nonlinear systems, limit cycle.

DESCRIBING FUNCTION ANALYSIS :
Definition, limitations, use of describing function for stability analysis, describing function of ideal relay, relay with hystersis, dead zone, saturation, coulomb friction and backlash.

LYAPUNOV'S STABILITY METHOD :
Lyapunov's direct method, generation of Lyapunov's function by Krasovskii's and Variable Gradient methods

SAMPLED DATA SYSTEMS:
Sampling process, mathematical analysis of sampling process, application of Laplace transform. Reconstruction of sampled signal, zero order, first order hold.
Z-transform definition, evaluation of Z-transform, inverse Z-transform, pulse transfer function, limitations of Z-transform,
State variable formulation of discrete time systems, solution of discrete time state equations.
Stability definition, Jury's test of stability, extension of Routh-Hurwitz criterion to discrete time systems.

Books :

1 Modern control engineering. K.Ogata

2. Control system engineering I.J. Nagrath, M.Gopal

3. Modern control principles and application J.C.Hsu and A.U.Meyer

4. Digital Control and State Variable Methods M. Gopal

5. Automatic Control System. B.C.KUO

EE-406 GENERATION OF ELECTRIC POWER

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

. Introduction:
Electrical energy sources, organization of power sector in India, single line diagram of thermal, hydro and nuclear power stations.

2. Loads and Load curves:
Maximum demand, Group diversity factor, Peak diversity factor, Types of load, chronological load curves, load-duration Curve, mass curves, load factor, capacity factor, utilization factor, base load and peak load plants, load forecasting.

3. Power Plant Economics:
Capital cost of plants, annual fixed cost, operating costs and effect of load factor on cost of energy, depreciation.

4. Tariffs and power factor improvement:
Objectives of tariff making, different types of tariff for domestic, commercial, agricultural and industrial loads. Need for p.f. improvement, p.f. improvement using capacitors, determination of economic p.f.

5. Selection of plant:
Plant location, plant size, no. and size of units in plants, economic comparison of alternatives , annual cost , rate of return, present worth and capitalized cost methods.

6. Economic operation of steam plants:
Methods of loading turbo-generators, input- output curve, heat rate, incremental cost , method of lagrangian multiplier, effect of transmission losses, co ordination equations, iterative procedure to solve co-ordination equations.

7. Hydro-thermal co-ordination:
Advantages , combined working of run off river plant and steam plant , reservoir hydro plants and thermal plants-long term operational aspects, scheduling methods.

8. Pollution and environmental problems:
Energy and environment, Air pollution, Aquatic impacts,nuclear plant and hydro plant impacts.

9. Cogeneration:
Definition and scope, Topping and Bottoming Cycles, Benefits, cogeneration technologies.

Books:

1. Generation of Electric Energy B.R. Gupta, S.Chand Publishers
2. Power Plant Engineering Dom Kundwar.
3. Power Plant Engineering R. K. Rajput.
4. Power System Engineering A. Chakrabarti, M. L. Soni, P. V.Gupta, U.S. Bhatnagar.

EE-408 Lab XV
(C.A.P.S.A. LAB.)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of experiments:

1. Developing a Single line Diagram of a Power System Using Computer Software.

2. Developing Algorithms/Flowcharts/Computer programmes for :

I. Load Flow Studies using

(a) Gauss Siedel Method

(b) Newton Raphson's Method

(c) Fast Decoupled Method

II. Short Circuit Studies for

(a) Symmetrical Faults

(b) Line to Ground Fault

(c) Line to Line Faults etc.

III Swing Equation for transient Stability Studies

IV. Economic Load Despatch.

EE-410 Lab. XVI
(Power Systems Design Lab.)

Internal Marks: 30	**L T P**
External Marks: 20	**0 0 2**
Total Marks: 50	

Students will complete design problems in the following topics:

1. Design of transmission systems for given power and distance.
2. Short circuit calculations and calculations of circuit breaker ratings for a power system network.
3. Design of substations
4. Design of distribution systems.

EE-412 SEMINAR

Internal Marks: 100	**L T P**
Total Marks: 100	**0 0 2**

Students will be required to prepare a report on a given topic related to latest developments in electrical engineering and deliver a seminar on that topic.

EE-414 PROJECT WORK

Internal Marks: 100	**L T P**
External Marks: 100	**0 0 6**
Total Marks: 200	

Design, Fabrication, Simulation, Evaluation,Testing etc. of any Electrical equipment, system is to be carried out under the supervision of guide(s).

EE-416 **EXTRA HIGH VOLTAGE ENGINEERING**

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

E.H.V. Transmission and Corona Loss:
Need for EHV Transmission. Use of bundled conductors, corona characteristics of smooth bundled conductors with different configurations, Corona loss. Factors affecting the corona loss. Radio interference due to corona. Shunt and series compensation in EHV lines. Tuned power lines. Insulation Co-ordination.

HVDC Transmission:
Advantages, disadvantages and economics of HVDC Transmission system. Types of D.C. links, converter station equipment, their characteristics.

Insulating materials used in H..V. Engg.:
Applications of insulating materials used in power transformers rotating machines, circuit breakers, cables, power capacitors.

Conduction and breakdown in Gases, Liquids & Solid Dielectrics:
Solids - Intrinsic, electromechanical and thermal breakdown composite dielectrics, solid dielectrics used in practice.

Liquids:- Conduction and breakdown in pure and commercial liquids, suspended particle theory, cavitation and bubble theory, stressed oil volume theory, Liquids used in practice.

Gases:- Ionization process, Townsend's current growth equations, Ist and 2^{nd} ionization coefficients. Townsend's criterion for breakdown. Streamer theory of breakdown, Pashen's law of Gases. Gases used in practice.

Generation of High Voltages:
D.C., A.C. (Power frequency and High frequency) Impulse voltage and impulse current Generation Tripping and contact of Impulse Generator.

Test procedures in H.V. Engg. Lab.
Testing of cables, insulators, bushings, circuit breakers and transformers.

References:

1. E.H.V. A.C. Transmission Engg. By Rakesh Das Bagamudre, New Age International Publishers.
2. HVDC Transmission by Kimbark.
3. H.V. Engg. By Kamaraju and Naidu.
4. H.V. Engg. By R.S. Jha.
5. H.V. Engg, by Kuffel & Abdullah.
6. H. V. Engg. by C. L. Wadhwa.

EE-418 **NON – CONVENTIONAL ENERGY SOURCES**

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

INTRODUCTION: Limitation of conventional energy sources, need and growth of alternative energy source, basic scheme and application of direct energy conservation.

MHD GENERATORS: Basic principles, gaseous, conduction and hall effect, generator and motor effect, different types of MHD generator, types of MHD material, conversion effectiveness, analysis of constant area MHD generator, practical MHD generator, application and economic aspects.

THERMO-ELECTRIC GENERATORS: Thermoelectric effects, Seeback effect, Peltier effect, Thomson effect, thermoelectric converters, figures of merit, properties of thermoelectric material, brief description of the construction of thermoelectric generators, application and economic aspect.

PHOTO VOLTAIC EFFECT AND SOLAR ENERGY: Photovoltaic effect, different types of photovoltaic cells, cell fabrication, characteristics of photovoltaic cells, conversion efficiency, solar batteries, application, solar radiation analysis, solar energy in India, solar collectors, solar furnaces and applications.

FUEL CELLS: Principle of action, Gibb's free energy, general description of fuel cells, types, construction, operational characteristics and application.

MISCELLANEOUS SOURCES: Geothermal system, characteristic of geothermal resources, choice of generator set, electric equipment precautions low hydro-plants, definition of low head hydrometer, choice of site, choice of turbine wind power, history of wind power, wind machines, theory of wind power, characteristic of suitable wind power site, tidal energy, idea of tidal energy, tidal electric generator.

Books:

Non convential Energy Sources G. D. Rai, Khanna Publishers.

Power System Engineering A Chakrabarti, M. L. Soni, P. V. Gupta and U. S. Bhatnagar, Dhanpat Rai & Co.

Generation of Electrical Energy B. R. Gupta, S. Chand.

EE-420 ENTREPRENEURSHIP

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

CONCEPT OF ENTREPRENEURSHIP: Entrepreneurship and small scale industry, need for promotion of entrepreneurship, entrepreneurship development programmes (EDP), personality, characteristics of entrepreneurship.

IDENTIFICATION OF INVESTMENT OPPORTUNITIES:
Governmental regulatory framework, industrial policy, industrial development and regulation act, regulation of foreign collaboration and investment, foreign exchange regulation act, monopolies and restrictive trade practices act, incentives for export oriented units, incentives for units in industrially backward areas, incentives for small scale industry, government assistance to SSI, how to start a SSI, list of items reserved for SSI. Scouting for project ideas, preliminary screening, project identification for an existing company.

MARKET AND DEMAND ANALYSIS: Information required for market and demand analysis, market survey, demand forecasting, uncertainties in demand forecasting.

TECHNICAL ANALYSIS: Materials and inputs,production technology,product mix, plant capacity, location and site, machinery and equipment, structures and civil works, need for considering alternatives.

COST OF PROJECT AND MEANS OF FINANCING:
Cost of project, means of financing, planning the capital structure of a new company, term loan, financial institutions, cost of production.

FINANCIAL MANAGEMENT:
Concept and definition of financial management, types of capital, source of finance, reserves and surplus, assets and liabilities, profit and loss statement, balance sheet, depreciation, methods of calculating depreciation, break-even analysis and charts.

MARKETING MANAGEMENT:
Marketing mix, strategies; product, place, price and promotion (four p's), market segmentation, product policies; types of product, product mix, packaging, branding, promotion; advertising, advertising media, personal selling, sales promotion, distribution channels.

COMPANY LAWS:
The basic principles of company laws, formation of company, choice of name, memorandum of association, articles of associations, registration and incorporation, alteration of object clause, situation clause, name clause and articles, kinds of companies, board meetings, power of board and delegation of powers, general meetings; postponement and adjournment and quorum for general meetings, revocation of proxy, kinds of general meetings.

Books:

1. Entrepreneurship of Small Scale Industries — Deshpande, M.D.
2. Marketing Management — Kotler Philip
3. Dynamics of Industrial Entrepreneurship — Hadimoni, R.N

EE-422 SYSTEM ENGINEERING & RELIABILITY

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

Concept of system engineering, Generalized Principles of modelling, factors in modelling, some examples.

Linear programming, dynamic programming, cost flow and routing problems. critical path scheduling.

Importance of reliability, reliability functions. causes of failure, modes of failure, failure rate, mortality curve, MTTF, repair rate, MTBF, Availability, uptime, down time, failure frequency, failure distributions, reliability modes statistical, structural, Markov and fault tree, Reliability, evaluation using various models, redundancy techniques, reliability allocation and optimization, basic principles of maintainability, availability and security.

Reference:

1. Optimization and problems in system Engineering — J.G. Rau.
2. Introduction to dynamic and control — R.J. Richards.
3. Optimization Techniques — S.S. Rao.
4. Reliability Engineering — E. Balagurusamy.
5. Reliability Engineering — A.K. Govil.

EE-424 BIOMEDICAL ENGINEERING

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

Transducers: Strain gauge for respiratory flow transducer, piezo resistive transducer for intracardiac catheter, thermistor as temperature sensing elements - its characteristics and compensation for non-linearity.

Piezoelectric transducer: its equivalent circuits and impedance frequency characteristics. Its applications as intra cardiac microphone, heart assist device and ultrasonic instruments.

Variable inductance transducer, different configuration and application for measurement of muscular tremor. LVDT and its signal processing circuitry.

Magnetostrictive and variable capacitance transducers, stretched diaphragm transducer and its characteristics.

Measurement and recording of bioelectric signals:

ECG,EMG,EEG and other instruments for picking up and reproducing bioelectric signals, specific design characteristics, sources of noise and its removal.

Measurement and recording of non-electric signal:

Measurement and recording of pressure, temperature, respiration rate, pulse rate and blood flow. Electromagnetic blood flow meter, thermography, ph measurements, gas analysis, ESR measurement, plethysmograph, X-Ray, tonometer and dialysis. Ultrasonics and echo-encephalography radiography imaging isotopes and nuclear medicine.

Equipment for effecting the human body:

Stimulator, defibrillator, pacemaker, diathermy.

Prosthetics: Upper and lower extremity prostheses, harness control, EMG-controlled externally powered prosthesis, basic concept of monofunctional and multifunctional devices.

Biotelemetry: Radio-telemetry of biological signal, signal source, antenna and frequency design considerations, example of single channel FM units.

Books:

1. Biomedical Instruments, theory and design. Walter Welkowitz and Sid Deutch. Academic press 1976.

2. An Introduction to Medical Electronics S.K.Guha, Bharti Publishers, Patna.

3. Handbook of Boimedical Instrumentation and Measurement Harry E. Thomas, Reston Publishing Company, 1974.

4. Biomedical Instrumentation Marvin D. Weisis, Chilton Book Company, 1973.

5. Principles of Applied Medical Instrumentation L.A. Geddes, L.E. Barker. John Willey and Sons, 1968.

EE-426 COMMUNICATION ENGINEERING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Modulation:

Need for modulation, Frequency spectrum of non-sinusoidal waves. Amplitude modulation theory. Generation of AM using, Grid modulated and plate modulated class C amplifier, modulated transistor amplifier.
Frequency modulation, Phase modulation, Generation of FM, Direct methods.

2. Pulse and Data Communications:
Information in a communication system, Coding generation and reception, PWM, PPM, PCM, Introduction to telegraphy (and Telex), Telemetry.

3. Radar Systems:-
Radar range equation, Basic pulsed radar system, MTI, CW Doplar Radar, FMCW Radar.

4. Broad Band Communication Systems:
Frequency Division Multiplexing, Time division multiplexing, Introduction to Microwave Link, Tropospheric scater link, Satellite communications.

5. Television Fundamentals:
TV transmitter and Receiver block diagrams, T.V. standards, scanning, blanking and Synchronising pulses, BW receiver block diagram. Colour combination, Colour transmission, Colour reception. Carrier Comm. On power lines.

Books:

1. Electronics and Comm. Systems George Kennedy.

2. Line Communication N.N. Biswas.

3. Principals of Communication Taub & Shilling (MGH)

EE-428 INDUSTRIAL AUTOMATION AND PLCS

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

1. Industrial Control Fundamentals:
Introduction to Feed forward control ,Cascade Control ,Multiple loop control, Adaptive Control.

2. Basic Control Algorithms:
Lag calculation, Lead/Leg calculation, PID controller calculation, Dead time calculation.

3. Electronic Process Controllers:
Analog Electronic Process Controller , temperature controller using an analog electronic controller, Computer Control Strategy.

4. Programmable Logic Controllers:

Introduction ,History of PLC's, Programming units , Introduction to programming languages, PLC's Ladder diagram principles ,Simple introductory programs using ladder diagram ,Advantages of PLC's, Economy of PLC's .

Books:

1. "Digital Control of Dynamic Systems"
Franklin , G.F. and J.D. Powell, Addison-Wesley, Reading Massachusetts.

2. " Process/ Industrial instruments and controls Handbook"
D.M. Considine ; McGraw Hill.

3. "Control Engg." ,Noel M. Morris, McGraw Hill.

EE-430 ELECTRICAL MACHINE DESIGN

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

GENERAL: ISI specifications for conductors, Transformer, transformer oil and induction motors. Standard specifications for rotating electrical machinery as per IEC publications.Temperature Rise Calculations and Measurement Sources and position of heat generation, Solid body heating, Heating and cooling processes. Calculation of steady temperature rise of induction motor armature and transformer core. Machine ratings based on thermal considerations. Typical temperature gradients in transformers and three phase induction motors. Methods of measuring temperature in Electrical machines.

Ventilation :

Methods of cooling transformer. design of tank. Types of ventilation methods of cooling 3-phase induction motors, cooling circuits and type of enclosures. Quantity of cooling medium, Air,Hydrogen, water and Oil.

Magnetic Circuits:

Magnetic circuits of transformers and three phase induction motor. Specific slot permeance and slot leakage reactance of a three phase induction motor leakage reactance of cylindrical coils and equal length and sandwich coils of equal width in a transformer. Variation in magnetic losses with changes with changes in supply voltage frequency of a transformer.

Electric Circuits:

Types of low voltage and high voltage winding transformer. Calculation of resultant mechanical forces in transformer under normal and abnormal conditions. Characteristics of an armature windings. Types of windings used for induction motors, winding factors.

Transformers:

Design of single phase and three phase core type poser and distribution transformers, single phase shell type transformer, Magnetic and electric circuit, leakage reactance, regulation, no load current, cooling system, overall dimensions and weight. Recent advances in design of transformer.

Induction Motors:

Design of squirrel cage and wound rotor type of three phase induction motors. Stator and its winding, slot and its insulation, squirrel cage and slip ring rotors, no load current, short circuit current, efficiency, circle diagram, Stator temperature rise, weight. Recent advances in the design of induction motors.

Books:

1. A Course in Electrical Machine Design — A. K. Sawhney, Dhanpat Rai.
2. Principles of Electrical Machine Design, — R. K. Aggarwal, S. K. Kataria & Sons.

CS-201 COMPUTER ARCHITECTURE

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

OBJECTIVES:
This course offers a good understanding of the various functional units of a Computer system and prepares the student to be in a position to design a basic computer system. Finally the student will be exposed to the recent trends in parallel and distributed computing and multi-threaded applications.

COURSE CONTENTS:
Principles of computer design-s/w ,H/w interaction , cost benefit concept of layers in architectural design.
Basic computer organization taking 8085 sa an examples binary arithmetic – add, subtract , multiply- algorithms and implementation , carry look ahead add fast adders.
CPU design – choice of instruction set control structure hardwired and microprogrammed control –RISC vs CISC , pipelining in CPU design superscalar m/c.
Memory hierarchy design caches ,main memory , interleave memory, virtual memory , architectural aids and implementing these
I/O modes – Program interrupt , DMA , channel , I/O processor.
I/O performance measures- Buses connecting I/O devices to CPU / memory – Interaction with o/s serial –parallel Interfaces taking 8251 and 8255 as examples
Performance evolution SPEC marks LINPACK wheatstone ,dhrystone etc. , transaction processing bench marks
Multiprocessors - Parallel and distributed computers –SIMD, SPMD & MIMD m/c.

Text references:

1) Patterson and Hennessy , computer Architectures , Morogaon kauffman, san mateo , CA , USA 1992

2) P.PAL chaudhary , computer organization and design , PHI , new delhi

3) P V S Rao , perspectives in Computer Architecture , PHI Pvt. Ltd., New Delhi

4) M.R Bhujade , Digital Computer Design Principles , Pitamber publishing Co. , 3rd Edition,1996

CS – 202 OPERATING SYSTEM

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

PREREQUISITES:

Computer Systems programming and Data Structures.

OBJECTIVES:

Understand the overall architecture of the operating system and its main components,
Functions of Kernel, file system architecture and implementation, concurrent programming and concurrency .

COURSE CONTENTS:

Introduction to Operating system, computer system structure , operating system structure, process management, CPU scheduling , process synchronization, deadlocks[35%]

Memory management paging and segmentation virtual memories[20%]

I./O system and secondary storage structure [10%]

Protection and security [10%]

Introduction to multiprocessor and distributed operating systems. [20%]

Case Studies: LINUX , UNIX Operating System with SOLARIS and SCO-UNIX [15%]

TEXT BOOKS:

1. A Silberschatz and Peter B. Calvin, " Operating System Concepts" Addison Wesley Publishing Company
2. Dhamdhere, " Systems Programming & Operating Systems Tata McGraw Hill

REFERENCES:

1. Operating System by Madnick Donovan

2. Operating System by Stallings

CS-303 COMPUTER NETWORKS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

I) INTRODUCTION:
Basic Concepts of analog and digital signals, data transmission concepts, Analog and digital transmission, transmission impairments. (L-6)

II) TRANSMISSION MEDIA:
Guided and Un-guided media, Performance, Shannon Capacity, Media Computerisation. (L-5)

III) ENCODING AND MODULATING:
Digital –to-Digital conversion, Analog and digital conversion, Digital to Analog conversion , Analog to Analog conversion. (L-6)

IV) DIGITAL DATA COMMUNICATION:
Digital data transmission , DTE-DCE Interface, EIA-449,EIA-530,X.21, Modems, Cable Modems. (L-6)

V) MULTIPLEXING AND SWITCHING:
FDM, WDM,TD, Multiplexing application- telephone systems, DSL, Par Circuit switching , Packet Switching & Message switching virtual circuits. (L-6)

VI) SPREAD SPECTRUM:
Concept ,Frequency hoping spread spectrum ,direct sequence spread spectrum, code-division Multiple Access. (L-4)

VII) ERROR DETECTION AND CORRECTION :
Types of Errors ,Detection ,VRC,LRC,CRC, Checksum, Error Correction. (L-4)

VIII) PROTOCOL ARCHITECTURE:
Protocols, Standards,……..OSI,TCP/IP Protocol Architecture. (L-3)

Text Books:

1. "Data Communications and Networking"–Behrouz A Ferouzan- 2nd Edition, TATA McGraw Hill.
2. "Data and Computer Communication" – William Stallings 7th Edition Pearson Eduction.

References:

1. "Data Communication and Distributed Networks"- Ulylers D Balck- 3rd Edition PHI.
2. "Computer Networks" – Andrew S. Teanebaum, PHI.

CS-305 DATABASE MANAGEMENT SYSTEM

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

PREREQUISITES: Data Structure

OBJECTIVES : To learn how to use a DBMS and how to build a DBMS.

COURSE CONTENTS:

Part – 1 Basic Concepts

Databases And Database Users: -
Introduction, Characteristics of Database Approach, Advantages And Disadvantages of Using DBMS. (L-2)

Database System Concepts And Architecture:-
Data Models, Schemas And Instances, DBMS Architecture And Data Independence, Database Language And Interfaces, Classification of Database Management Systems. (L-3)

Data Modeling Using The Entity Relationship Model:-
Entity Types, Entity Sets, Attributes And Keys, Relationships, Relationship Types, Roles, And Structural Constrains, Weak Entity Types, ER Diagrams, Naming Conventions And Design Issues. (L-4)

Part – 2 Relational Model, Language And Systems

The Relational Data Model, Relational Constrains, The Relational Algebra and Relational Calculus:-
Relational Model Concepts, Relational Constraints And Relational Database Schema, Update Operations And Dealing With Constraint Violations, Basic Relational Algebra Operations, Example of Queries in Relational Algebra, The Tupple Relational Calculus, The Domain Relational Calculus. (L-6)

SQL Relational Database Standard:-
Basic queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Views in SQL, Additional Features of SQL. (L-6)

Part – 3 Database Design Theory and Methodology

Functional Dependencies and Normalization for Relational Databases:-

Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms.
(L-4)

Part – 4 System Implementation Techniques

Transaction Processing Concepts:-
Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Schedules and Recoverability, Serializability of Schedules. (L-3)

Concurrency Control Techniques:-
Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Validation Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking.(L-3)

Database Recovery Techniques:-
Recovery Concepts, Recovery Techniques Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging (L-4)

Database Security and Authorization:-

Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges, Introduction to Statistical Database Security. (L-3)

Text Books :

1. Fundamentals of Database Systems, Third Edition, by Elmasri/Navathe
2. Korth and Silberschatz Abraham, Database Concepts, McGraw Hall,1991
3. An introduction to Database Systems by C.J.Date.

References :

1. An introduction to Database Systems by Bipin C. Desai.
2. SQL,PL/SQL ,The programming language of oracle, Ivan Bayross BPB Publication.

CS-308 SOFTWARE ENGINEERING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

PREREQUISITIES:

Computer fundamentals, Concepts of structures programming, Programming in atleast on high level language, Elementary data structures, Elementary probability theory, Business Information system and Database Management System.

OBJECTIVES:

The course should provide an introduction to the fundamentals principles of software engineering. The present course should seek to equip the student with a repertoire of principles, tools and techniques and make him/her appreciate that software engineering is, after all, an exercise in making compromises.

COURSE CONTENTS

Software Engineering Principles: How is software engineering an engineering discipline, Information system characteristics, software development process models, life cycle concepts, software phases and deliverables, software development strategies. [15 %]

Technical Development: Structured systems analysis and design requirements collection and specification, data flow and logical data modeling, cost benefit analysis, feasibility study, architectural and detailed design, process, data, network, control and user interface designs, physical data design, dynamic modeling for real-time systems. [15 %]

Software Project Management: principles of software project management organizational and team structure, project planning, project initiation and project termination; technical, quality and management plans, project controls, cost estimation methods-function points and COCOMO, tools. [15 %]

Software Quality Management: quality control, quality assurance, quality standards, software metrics, verification and validation, testing, quality plans, tools Configuration Management [15 %]

Software Development Method & CASE: formal, semi-formal and informal methods; data function, and event-based modeling, some of the popular methodologies such as Yourdon's SAD, SSADM etc. CASE tools, CASE standards.[20 %]

Implementation: in 3GL environment, in 4GL environment, in client-server environments, coding styles. [20 %] Documentation, Software Maintenance [5 %]

TEXT BOOKS: 1) Pressman R. S., Software Engineering: A practitioner's Approach, Third Edition McGraw Hill, New York, 1987.

2) Jalota, Software Engineering.
3) Sommerville I., Software Engineering, Fourth Edition, Addison - Wesley Pub. Co., 1992.

REFERENCES:

1) Ghezzi C., Jazayeri M. And Mandrioli D.: Fundamentals of Software Engineering, Prentice Hall, N. J. 1991
2) Pfleedger S. L., Software Engineering: The Production of Quality software, Second Edition, Macmillan Publishing Company, 1991.
3) Oehm B. W., A Spiral Model of Software Development and Enhancement, IEEE Computer, 21.pp 61-72, May 1988.
4) Fairley R., Software Engineering Concepts, McGraw Hill, New York, 1985.

CS- 309 COMPUTER GRAPHICS

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

OBJECTIVES:

Understanding the fundamental graphical operations and the implementation on computer, Get a glimpse of recent advances in computer graphics, Understanding user interface issues that make the computer easy for the novice to use.

COURSE CONTENTS:

Introduction: What is Computer Graphics, Elements of a Graphics, Workstation, Graphics hardware, I/o devices, Display devices [L-4]

Basic Raster Graphics: Scan conversion [L-4]

Filling [L-2]

Clipping. [L-2]

Geometric Manipulation: Transformations [L-4]

Matrices, Homogeneous Co-ordinates. [L-6]

Elementary 3D Graphics: Plane projections, Vanishing points, Specification of a 3D view. [L-6]

Visibility: Image and object precision, z- buffer algorithms, area based algorithms, floating horizon. [L-6]

Advanced Issues: [L-4]

A. Curves and surfaces: Parametric Representation, Bezier and B-Spline curves.

B. Rendering, raytracing, antialiasing, fractals, Gourard and Phong shading.

TEXT BOOKS:

1. Computer Graphics (Schaum Series) by Lipschutz (McGraw Hill)
2. Hearn and P. Baker. Computer Graphics, Prentice Hall.
3. C. Graphics by Yashwant Kanetkar.

REFERENCES:

1. D. Rogers and J. Adams, Mathematical Elements for Computer Graphics, McGraw -Hill International Edition.
2. David F. Rogers, Procedural Elements for Computer Graphics, McGraw Hill Book Company.
3. Alan Watt and Mark Watt, Advanced Animation and Rendering Techniques, Addison-Wesley.
4. Young, X Window. System Programming, OSF/Motif Edition, Prentice Hall.

CS-452 FUZZY LOGICS AND SYSTEMS

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**
Total Marks: 100	

Introduction: Grip sets and fuzzy sets, properties of x-cuts, Representation of Fuzzy sets.

Operations on Fuzzy sets: Types of operations, Fuzzy complements, intersections and unions.

Fuzzy Arithmetic: Grip versus Fuzzy Relations, binary fuzzy relations, Fuzzy Equivalence. Compatibility and ordering relations, Fuzzy Morphisms, Fuzzy relation Equations and Approximate solutions.

Fuzzy Logic: Multi-valued Logics, Fuzzy propositions, Fuzzy Quantifier, Linguistic Hedges.

Fuzzy Systems: Controllers: An overview and example, Fuzzy dynamic systems, Pattern Recognition, Fuzzy data bases and information, Retrieval Systems.

Books:

1. Fuzzy Sets and Fuzzy Logic : Theory and Applications by G. J. Klir and B. Yuan, PHI.
2. Fuzzy Logic with Engineering Applications, Timothy Ross(Mc-Graw Hill)

CS-454 NEURAL NETWORKS

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

Neural Networks characteristics, History of development, Neural Networks Principles, Artificial Neural Net terminology, Model of a neuron, Topology

Learning: types of learning, Supervised, unsupervised, re-inforcement learning.

Basic Hopfield Model, the perceptron, linear separability,

Basic learning Laws : Hebb's rule, Delta rule, Widrow & Hoff LMS learning rule, correlation learning rule, instar and outstar learning rules.

Unsupervised learning, competitive learning, K-means clustering algorithms, Kohonen's feature maps.

Radial Basis Function neural networks , basic learning laws in RDF nets, Recurrent networks, recurrent back propagation, Real time Recurrent learning algorithms.

Introduction to Counter Propagation Networks, CMAC networks, ART networks.

Application of neural nets such as pattern recognition, optimization, associative memories, vector quantization, control.

Application in speech and decision making.

References:

1. Artificial Neural Networks Yagna Narayanan
2. Neural Networks and Fuzzy Logic Bart Kosko

Neural Networks